University of Jordan
Faculty of Medicine

Medical Committee
The University of Jordan

Community Medicine

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The last lecture talked about environmental systems in Jordan which are mountains, deserts, valleys, costal and marginal regions.

The environmental system forms what we call **Food Pyramid** or **Food Chain**.

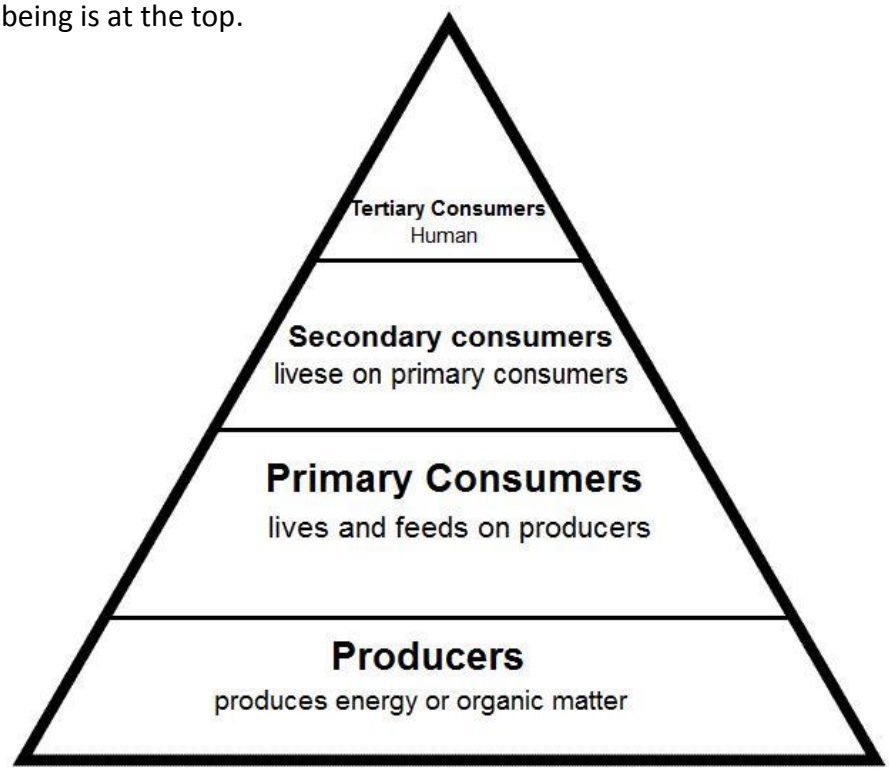
The idea is how the energy moves inside the system and this can be presented in the form of a pyramid.

***Food pyramid:**

the transfer of energy from one level to another within the system.
There should be a pyramid in each system and anywhere in the world.
This pyramid has **3 levels** (4 according to some references), a wide base and a narrow top and it has to be in this form.

1) Producers: Creatures which are capable of producing energy. They represent the base (bottom) of the pyramid.
Examples:
- plants (in land)
- planktons الأشنات (in oceans): small creatures look like the algae they are capable to take the light and form energy.
- Sea weeds

2) Consumers: Primary, secondary and tertiary.
- Human being is at the top.



If energy keeps going upward, the source of energy starts to disappear, so we need something to bring the energy back to the system, which is the **Decomposers**
المحللات

*Factors of the environmental system :

***Decomposers :**
they are capable of working on dead bodies and waste of other creatures and break it down into simpler materials.

***Sweepers:**
they clean up the system.
Examples:
- Ants that start to feed on a piece of meat, chicken bone somewhere in the house.
- Birds in the desert are seen very close to the person when he starts to fear death.
- Hyenas in the forest feed on dead bodies.

These sweepers can smell death, which means they know this creature is going to die, and come from far away to clean up the system.

Note: Sometimes decomposers take time until they start to work because of bad weather or something, those sweepers can work earlier.

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If you invert the pyramid upside down, there will be no producers; creatures start to die and the system will disappear.

Example:
In Somalia, where there is no enough producers, people and creatures start to die until either somebody from outside help by giving food, or the system will continue dying and a new pyramid will be formed.

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On the other hand, there is a bad side of the food pyramid. **It is a root of entry for many pollutants inside our food items**.

Examples:
related to **Mercury**
- If somebody is looking for gold in Brazilia using mercury to separate gold from other materials, it ends up in the fish, so when we eat the fish we are affected by the mercury.

-In 1952,Minimata, people used to eat fish most of the time from Minimata bay, suddenly they start to notice that the new born babies and animals have microcephaly (small heads) and retarded.
- In 1964 scientists discovered that the cause was mercury from a factory not far away from the place, they throw the mercury in the ocean and it ended up in the food system.

- 3 years ago, there was a panic because one of the factories discovered that their tona has high levels of mercury. They were about to call back all the shipments, but it was impossible to do that because it was already spreaded worldwide.

Note: There is a disease called minimata disease (Mercury Poisoning).

Related to **DDT**

- 1985, a Chemist from the university took milk samples from 10 lactating women in Amman, he looked for DDT (one of the pesticides) and discovered pesticides in these samples, although none of them work in the agriculture or use DDT regularly.
-So, from where they get DDT in their milk?
DDT used to be used in alghor areas الأغوار to fight mosquitoes and malaria → it falls down and eaten by the cows → meat and milk of those cows eaten by people.
-Another surgeon took samples from the joints of his patients and he found DDT.
-In another static, samples were taken from a larger number and from other tissues from the bodey, also DDT were found! So people are not using it in the right way.
- In Germany, one of the physicians advised ladies not to lactate breast feeding their children for more than 6 months because there was so high levels of DDT in their milk, then the benefit for the child is much less than the harm that may be caused to him.

- In Japan, Fukushima disaster "Tsunami" affected the nuclear stations. A huge nuclear radiation affected fish in the ocean which is exported to people worldwide.
-The problem with the 3rd world countries that examining the food items is very expensive and need sophisticated technology so they might be using an indicators, like if they use Lead as indicator for other heavy metals, so if there is no Lead then there is no other heavy metals which not true all the time.

* Biodegradation

*Bio-Degradable material:

a material which can be degraded (broken down) by creatures to simpler forms.
If it is thrown in the environment it will take some time then it will be degraded and disappear.

Materials that are not Bio-Degradable will stay in the environment for a long time, which is a problem. This is connected to what is called **"Persistent"**.

*Persistent:

the amount of time needed for 80% of the material to disappear from the environment.
(If you put 10 grams of a certain material somewhere in the environment, the time needed for 8 grams to disappear is the Persistent).

***Bioaccumulation:**

tendency of a chemical to accumulate inside the organisms.

Examples:

- Lead accumulates in the long bones, so if a person is poisoned by Lead, you have to do a fluorescent view in the long bone to find Lead.

Note : Doctor said that ,as doctors, we have to know these terms as our body handles lead the same way it handles calcium in absorption, both of them end up in the long bones, so if you don't know that you won't take a fluorescent view for the long bone thus you won't find Lead. So you need to know this in order to know where to look in the body.
You have to look in the blood first then the long bones where Lead accumulates.

- DDT accumulates in the milk like in the women (in the fat tissue of males and females).

***Biomagnification:**

as we go up in the food pyramid the concentration of the material increases.
Example:
You throw a very small amount of DDT on the grass → one worm feeds on grass (more than one herb maybe 20 or 30) → A bird feeds on worms (also 20 or 30) → Biomagnification with high concentration (may reach up to 25,000 - 30,000 times magnification).

So we have to be careful especially if the material is Bio-Accumulative and not Bio-Degradable.

They found DDT in the arctic though there is no agriculture there, that is because of the high persistent, it started to bioaccumulate, they are not bio-degradable and start to be at higher levels.

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***Environmental Balance (Eco Balance):**

It is a sort of harmony between the different components of the system (Living & Non-living).
- It is necessary to keep life in the system.

Examples:

- Zarqa River used to be a place for enjoyment with a nice nature, but because of disasters, throwing trash, pollutants in water and the environmental balance was lost and it is no longer a system(everything was killed and there is no more life on this place).
- In Europe, Times and seine rivers were undergoing the same process but people start to work on them and revive them again. Now they are alive!
- In Canada, there are thousands of lakes. If you stand and see the bottom of the lake, this lake is considered to be dead, as there should be life in the lake. The pollutants fall down from the USA

and kill these lakes.

Factors of the environmental balance:

Growth Factors Vs. Reducing Factors.

- These factors keep the system alive.
- Reducing factors are important as if we only have growth factors, the system will be uncontrolled.

1) Growth Factors:

Push the system to be larger.

Become more complicated as we go upward.

Biological growth factor: Tendency to reproduce.

E.g.:

- Reproduction:

to increase the No. of creatures inside the system.

Even the bacteria (unicellular) reproduce by division.

- Immigration:

Creatures immigrate at certain condition to keep themselves until the condition is good they come back. E.g: Salomon immigration

Non-biological Growth factors: Food - Water - weather condition (e.g. plants flourish in spring)

2) Reducing Factors:

Slow down process.

Biological Reducing factors:

- Diseases: will reduce the capability of this creature to reproduce.
- Death

Non-biological reducing factors:

Lack of food - water - weather condition (e.g. some plants die in summer because of the lack of rain)

Good Luck