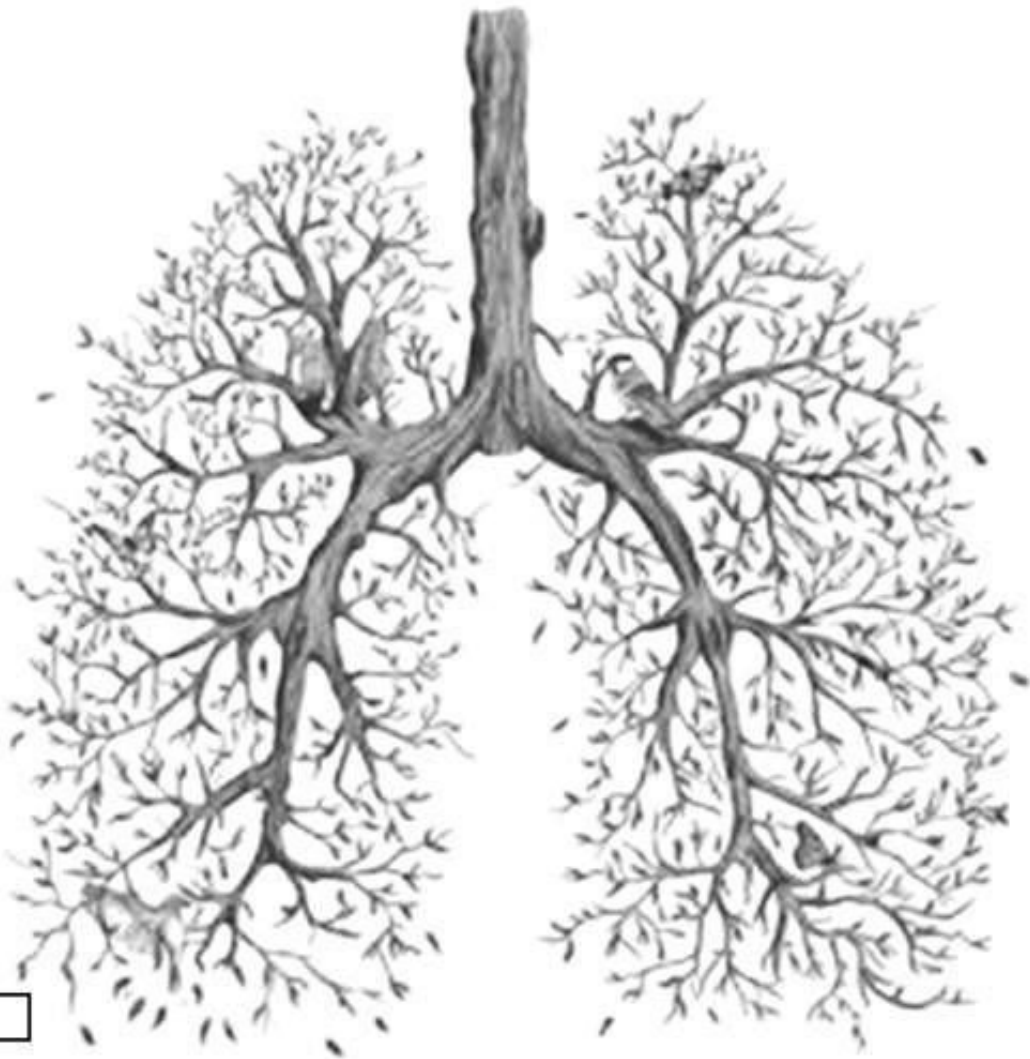


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Community Medicine



Slides

Sheet

Lecture # 17

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Environmental Health

We will be continuing our discussion on Environmental Health.

Last lecture we talked about living and non-living components of the environment.

- These components have to be in a certain place and have inter-relations between them, these relations should end up in what we call equilibrium, and this equilibrium is called **environmental balance** or **ecosystem balance**.
- Environmental balance is needed to maintain life in that system.

You might hear Fairuz' song "Burda" about the "Burda" river in Lebanon; however, if you get to visit the "Burda" river, you'll say there is something wrong here, either the one who wrote the song is mistaken or somebody has done something wrong, because all you see is black water. It has been polluted to the extent that balance had been lost, and death is the outcome for almost everything. "Alzarqa" river and many rivers in Europe face the same problem.

In conclusion, we are in great need of the ecosystem balance.

Now what keeps this balance (between living and non-living components in a system)?

- Two groups of factors (**pull & push**) or (**growth & reduction**).

1- **Growth factors**: factors that tend to increase the number of creatures within the system.

2- **Reducing factors**: factors that reduce (decrease) the number of creatures within the system.

- If we only have growth factors we lose the system, there should be counteraction. Each of these two groups of factors plays its own role in maintaining the balance of the system.
- These factors (growth & reduction) could be *biological* or *non-biological*. An Example of a **biological factor** that makes the system **grow** is **Reproduction**. Each creature (single cell or a complex system) tends to replicate itself. It could be very simple like a single cell dividing into two, or complicated like human beings and animals where they require things before they can reach this stage. *Keep in mind that reproduction is a biological growth factor.*
- Reducing factors can be:
 1. Diseases.
 2. Death: each creature has to die at some point. Turtles might live up to 250 years, while some single cells might live for a few seconds and then die (this is a control factor).
- An example of a **non-biological factor** is **availability of food**. Look at the forest in the beginning of spring, you have good food and good temperature, these two variables will make creatures try to reproduce and grow. When the harsh winter comes, these creatures start to get sick and die because of lack of food or the temperature is too low.

You don't have to attend to a forest to take care of it, it takes care of itself.

Ex. You will always have a certain number of lions in a certain place and a certain number of rabbits (It's possible for lions to outnumber rabbits).

- **Natural enemies** are another issue. For many creatures there are natural enemies. These natural enemies will try to reduce these creatures number by feeding on them.

In conclusion, this sort of balance is needed and these factors (pull & push) work together to maintain the system.

There are certain **definitions** that we need later on when we are going to talk about components of the environment, and they are:

1. Biodiversity

- In each system that we talked about there should be different types of species, and this biodiversity is an outcome of its balance.
- World conferences are held under the name of biodiversity, and many scientists specialize in biodiversity.
- If we are going to judge a system (ex. a lake) to tell whether it's polluted or not, we can take a sample (ex. Water sample), send it to the lab, look under the microscope and see the type of creatures in that water.

If there is a good number/variation → this water is healthy (not polluted).

If I find it having one of two species only → most probably it is contaminated without doing any further studies.

- **So**, we need this biodiversity and we have to take care of it, the moment we lose it we lose the system.
- If you go to "Burda"/ "alzarqaa" river, you'll find one or two species only because there are certain creatures that can survive at the worst situations; however, the majority won't.

- The drugs that we use are from forests most probably, so if we lose biodiversity we lose these drugs. When scientists try to synthesize a drug (switch from natural to synthetic), they look for the original compound that contains the active ingredient among other ingredients, and then they try to synthesize it if they can. And in order to find that original compound we need biodiversity.
- Unfortunately, nowadays we are losing biodiversity worldwide due to hunting and attack on forests which results in cutting down in the number of species.
- A lot of species in the world have disappeared and this is dangerous; because each creature has a role in its system and if you take that creature out then you affect the balance for other creatures.

2. Biodegradation

Degradation: It is breaking down of certain matter to smaller parts.

This is what happens to materials that we throw in the environment, and one major type of degradation is called **biodegradation**.

Biodegradation: degradation by living organisms. (Ex. Microbes are decomposers)

- Materials that we use can be classified according to their biodegradation to different degrees:
 - A. Some of them are **easily degradable** (throw it away and after a short time, it starts to be degraded and disappears).
 - B. **Non-biodegradable/ very slowly degradable**, these may take years and years to degrade.

Ex. When you throw away any plastic card, it might take 4000 years to be fully degraded. Also, plastic bags are non-biodegradable; it is a very bad kind of plastic and damages the environment.

- As a result, we are losing a lot of lands and animals due to the non-biodegradability of these materials.

3. Bioaccumulation

It is accumulation of materials inside the body of certain organisms.

Example

Tests made on breast milk of a number of Jordanian ladies (in Amman) for detection of the presence of DDT pesticide and its derivatives and metabolites showed high levels of this pesticide. However, the number of subjects was insufficient (10 ladies) and therefore the results were not published.

Later on, further tests were made on ligaments taken from joints, again they found DDT and its derivatives in these joints, and this made the study stronger.

(Previous samples were taken from orthopedics, who use them for diagnosis and then they might be used for tests before throwing them away).

Then, samples were taken from inside the body (ex. Kidney, appendix, liver), and the test also came positive for the presence of DDT and its derivatives.

Those people did not have direct contact with DDT nor did they work with it.

What does that mean?

- This is due to bioaccumulation. DDT is used in “alghour” area to control mosquitoes in order to fight malaria, part of it falls on the grass and is eaten by cows, through the cow’s milk and meat it gets into our bodies and accumulates in our lipids.

Now concerning breastfeeding women, their milk will contain some of it since milk is lipid soluble, and some of it will be transferred to the baby. Bioaccumulation takes time, she will take a little bit of the DDT each time (it is not degraded), and it starts building up.

It has a similar story to that of CFC: It was created, we liked it, and everybody wants to use it worldwide to discover eventually that it causes health problems.

The reason behind these health problems is bioaccumulation. In fact, this material (DDT) can stay for 10–20 years in the environment. It was also found in the North Pole, where no one uses DDT, but it was carried with waves and reached there.

A story about DDT (-.-)

A woman/nurse who did not really look after her 4 daughter discovered the presence of lice in their hair, so instead of getting them a shampoo that contains Lindane (a toxic pesticide) and DDT derivatives, she got these pesticides from a place that actually sells them to farmers, made a solution, and applied it to their hair at night. In the morning one of them was dead, two were paralyzed and the fourth needed several months under intensive care to be saved.

In the future, you will face certain conditions of people who are poisoned with these materials, so you should know how to handle situations like these.

4. Bio-magnification

It is a process whereby the tissue concentration of a contaminant increases as it passes up the food chain through 2 or more trophic (relating to food) levels.

Example

Contamination of the Amazon river with a low concentration of mercury, which is taken up by small fish and it bioaccumulates inside of them. Later on, small fish are eaten by larger fish, a larger fish will eat more than one, and so concentration of mercury in that fish will be much more. Then, it is eaten by even larger fish and so on (in this example concentration of mercury is being magnified).

* **Bioaccumulation** occurs within an organism, and **biomagnification** occurs across trophic (food chain) levels.

How do we –as humans– harm environmental balance?

What is the negative role of humans on this balance?

- 1- Pollution.
- 2- Simplification of ecosystems.
- 3- Interference with growth and reducing factors.
- 4- Man-made disasters.
- 5- Abuse of resources.

We will speak of them in detail.

1- Pollution

Contamination: adding something from outside or changing the original components of a material but to the extent that can cause health effects.

Ex: If you bring a glass of water, what you will find in it? You will find H₂O and certain minerals. Is the water contaminated because of this minerals? No, because the presence of these minerals didn't cause health effects.

2- Simplification

Changing a complex system into a simple one.

First Example

When I have a forest that I want to change into an agricultural area or a ranch to raise animals, at first I have to cut its trees and kill creatures inside it. So the forest is a complex system (and as we previously said we don't need humans to take care of it); however, the moment you change it into a farm (a simple system), it becomes vulnerable. You can't grow your tomatoes in that farm, leave them for a year and then collect your crop, because now it is vulnerable to any change in the environment (temperature, enemies, diseases), it might die, so it needs someone to take care of it.

Simplification makes a system vulnerable and unable to withstand the insults that a complex system can face, and this is what damaged Africa! People coming from Europe started cutting trees and turning these lands into farms to grow cash crops or raise cattle, and by this they damaged the system.

When they cut down trees, this will lead to less cool conditions, and therefore less rain, so the remaining part of the forest won't have enough water, and it starts to die off. Because of this many countries in Africa don't even have a single tree.

Second Example

In Jordan umaweyan and abaseyan caliphs (الخلفاء العباسيون والأمويون) built their palaces in the Jordanian desert (ex. Mashta & Amra Palaces), If you look at the drawings they made back then, you'll find forests where they used to hunt deers.

What happened to these forests? During Othmani conquering (400 years) people started attacking these trees to get a source of energy, and they also used tree logs to support the Hejaz Railway, they used to cut it in half and put it

under the metallic lines, and the remaining wood was used to get the trains moving.

People were later unable to regrow these trees, and an attempt during the time of the late king AlHussein was made to get a greener Jordan "الأردن الأخضر", but it did not succeed.

3- Interfering with the growth and reducing factors

First Example

In 1852, a British scientist noticed that there were no rabbits nearby in the forests of Australia, so in his next visit to Australia he brought 26 pairs of rabbit with him, and let them go near his house.

In 1952, these 26 pairs became millions, Australians didn't like to eat rabbits and there was no natural enemy for these rabbits (ex.fox), so they multiplied and became the number one cause of desertification in Australia.

These tiny creatures which weighed 3kg now weigh 6-7 kg, and are ferocious fighters, they eat everything, and they also build their houses underground to hide from the rain and cause erosion.

These rabbits started attacking farmers, who build the second largest synthetic wall to prevent these rabbit from attacking them.

Second Example

Back in the united stated, another scientist who used to live in Boston (where they have lilies (زنبق)) moved to Florida (where they had no lilies at first), he then decided to take some lilies with him to Florida and grow them in water. Growth of lilies in Boston was controlled by its bad weather; however, in Florida that

was not the case (no bad weather to control it's growth). So lilies' growth in Florida caused problems in water channels and rivers, and millions of dollars were paid every year to cut these lilies so that they can pass through with their boats, swim or use this water.

4- Man-made disasters

Number one is war.

First Example

Zionists الصهاينة used to cut down olive trees in Palestinian lands, deliberately causing erosion of the soil, in order to force them to move.

Second Example

Americans used to spray pesticides on bushes and forests to prevent Vietnamese soldiers from hiding between the bushes. This damaging effect lasted for a long period of time, in certain areas there is no way to grow new trees due to the huge amount of chemicals.

Third Example

In Iraq, uranium contaminated the soil, it was done unintentionally; however, weapons contain this material, and it will take a long time to get rid of this uranium.

5- Abuse of Resources

If we have a fishery that can feed 1 million people, and now we have 2 million people, this fishery won't be able to adequately supply them. Not only does it not contain enough fish but we also lose this fishery ; because we are no giving them enough time to multiply. This happened in Aqaba, so now we have to reach all the way to Yemen to get fish.

If you cut down forests haphazardly, you will lose it (like in Jordan and Africa).

You still can cut trees at a rate of its growth, but we have to respect **environmental tolerance** (tells us how much cutting down of trees forests can tolerate), if you exceed this tolerance, you lose the forest.

If a grazing area can tolerate only 100 heads of animals, and you feed 200, then you lose that graze completely.



Good luck & don't forget to make duaa for me.

Special thanks go to aseil, lujain & aseel ☺