

Climate Change, pollution and its effect on Fish

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Abstract: The issue of global warming has become a settled issue after many quirks and its results are expected to come to everyone in the near future if the man continues his absurd environmental course. In Copenhagen, the world's most important summit was held to consider this global threat to the future of mankind on the ground and held many hopes for this summit, which did not reach the results of Level expectations. But it represents an important shift in the world's dealings with this frightening phenomenon, which will cause severe damage to 84 countries in the near future, and will extend to other countries in the distant future. From the level of awareness of the crisis, global warming threatens countries by drowning, and others by desertification, beating economies and threatening everyone with more diseases.

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Introduction

Climate change means the imbalance in the prevailing climatic conditions such as temperature, wind and distributions of rainfall characteristics of each region on the surface of the Earth, which is reflected in the long run on the prevailing biological systems.

Physical Changes

Climate change will come with changes in:

- Temperature
- Ice coverage melting
- Sea level
- Rain (Less or acidic)
- Evaporation will increase
- Dryer conditions
- Ozone Depletion
- Erosion, and

Affecting ecosystem structure & functioned global warmin (greenhouse effect)

Human activities have led to the increase of the rate of emissions of greenhouse gases (Global Warming) and increasing their concentrations in the atmosphere.

Six greenhouse gases are:

1. Carbon dioxide and Carbon Monoxide
2. Methane
3. Nitrous oxide
4. Pyrofluorocarbons
5. Hydrofluorocarbons
6. Sulfur hexafluoride

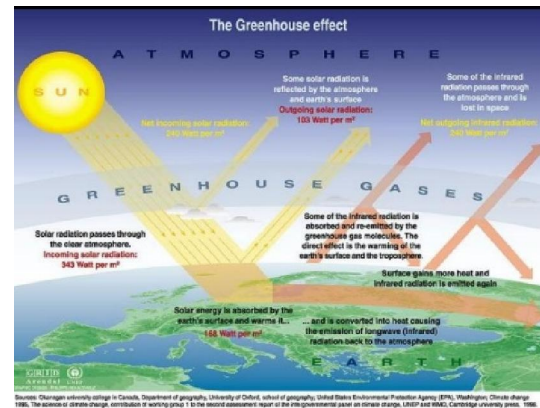
GLOBAL WARMING (GREENHOUSE EFFECT)

◆ These gases are mainly a result of humans burning oils and forests.

◆ These gases are known as greenhouse gases because just like the panes of a greenhouse they allow

the sun's radiation to pass through but hinder the escape of heat and trap heat in the lower atmosphere.

◆ Actually, water is also a greenhouse gas because clouds do the same thing.



Temperature

◆ The temperature of the Earth's surface was recorded to steadily increase over the past hundred years, ranging between 0.5 - 0.7 °C.

◆ Scientific study has predicted that temperatures would raise in Egypt about 1.5 °C in 2050 and by about 2.4 degrees °C in 2100.

◆ An increase in emissions of carbon dioxide in Egypt by 109.5 % in 2004, amounting to about 158.2 million metric tons, compared with about 75.5 million metric tons in 1990.

Ave. temp. to increase 1-3.5° C by 2100

Ice Cover

◆ Ice cover has shrunk by 10% since 1960 until 2001.

◆ Major loss of fresh & sea ice (up to 50 %).

◆ Ice coverage melting impacts ice-associated species, primary productivity, fishing and aquaculture.



Sea Level Rise

- The average sea level around the world raised from 10 to 20 cm since the late nineteenth century until the end of the twentieth century
- Up 15-95 cm by 2100
- This threatens many areas of drowning especially lowland and coastal cities from disappearing into the sea.

Less rain and Desertification

- Desertification: the transformation of land to desert conditions because of Dryness.
- There will be more droughts inland, which will reduce crop yields and also cause trees to die off.
- If the earth's temperature rises due to the greenhouse effect, more water will evaporate, forming more clouds, compounding the problem.

Acid Rain

- Coal and oil that is burned will release sulfur dioxide into the air.
- Automobile exhaust puts nitrogen oxides in the air.
- Both sulfur dioxide and nitrogen oxides are converted to acids when they combine with water vapor in the atmosphere.
- That gives the rain an even more acid pH.

- When the soil absorbs this rain, it becomes acidic too, and it causes forests to die, and the waters cannot support normal fish populations.

The Harm Done by Acid Rain



Victims of acid rain - dead and dying Red Spruce in Maine. Photo by Paul Donahue

Ozone Layer

- Ozone is a naturally occurring substance that is supposed to stay up high in our atmosphere.
- The ozone layer thickness ranges from 2 - 8 km. The role of the ozone layer is to absorb the

harmful ultraviolet radiation (UV-B) that tries to enter our planet and to protect all creatures.

- UV-B radiation reaching the earth's surface has increased due to stratospheric ozone depletion as a consequence of human activity.

Ozone Layer

Chemicals that destroy the ozone layer:

CFCs

HCFCs

Carbon tetrachloride

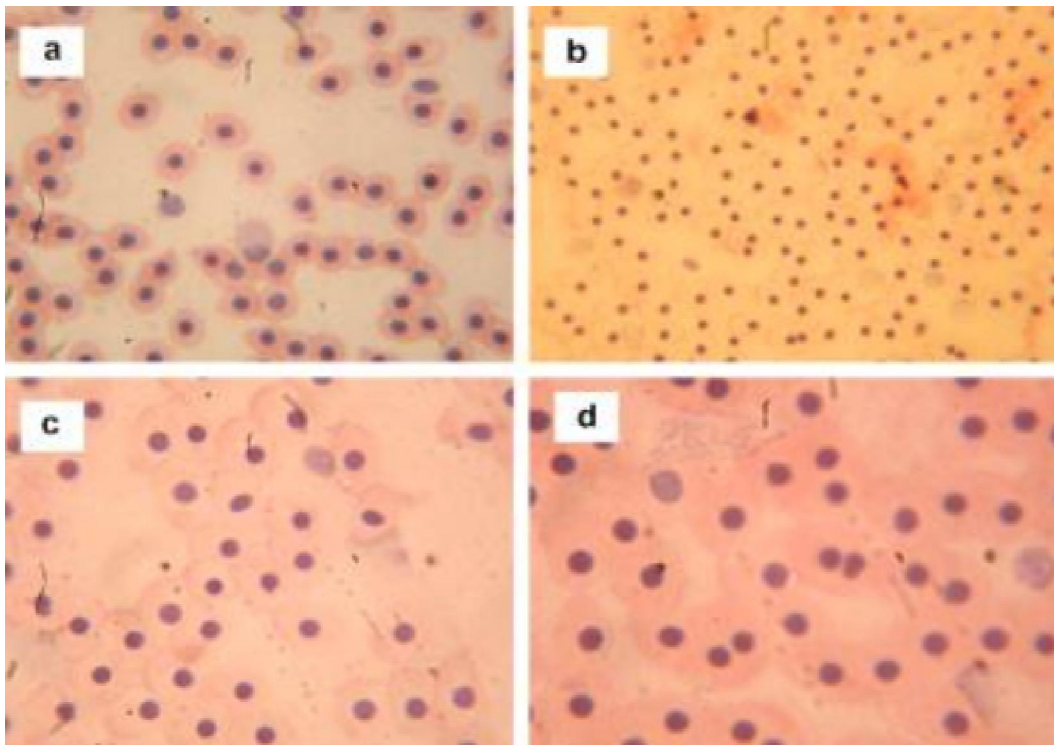
Methyl bromide

Ozone Depletion and Ozone Hole

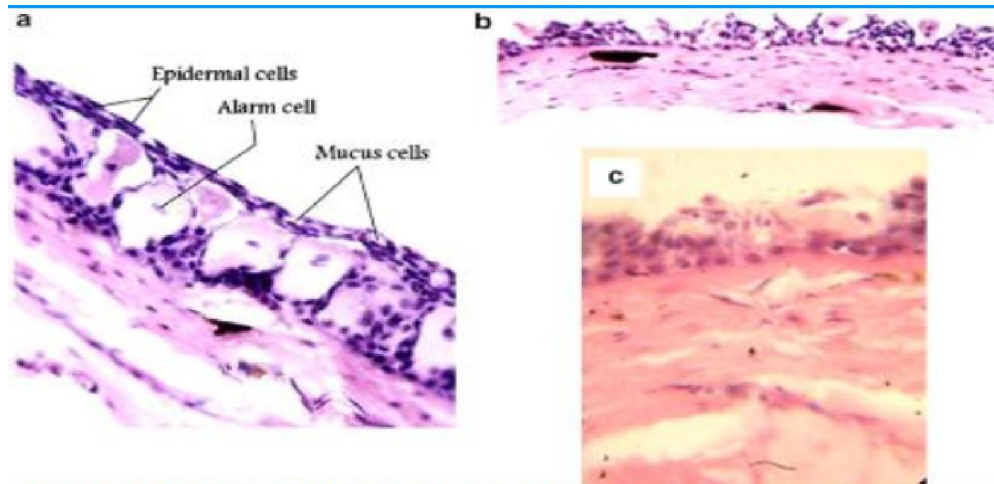
◆ When the ozone in the upper part of our atmosphere becomes depleted, UV radiation impairs crop and tree growth and also kills plankton (microscopic plant and animal life) that sustain aquatic life.

◆ UVR has both positive and negative effects.

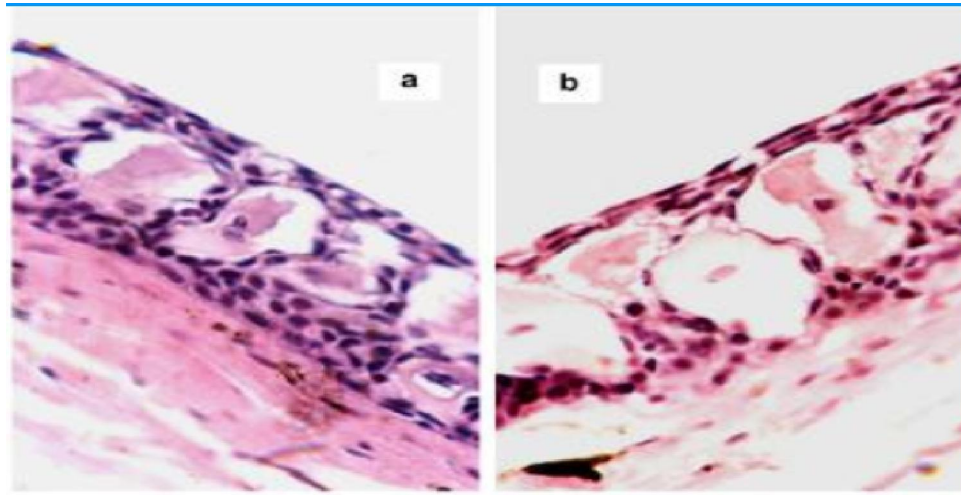
◆ Among the negative effects: decreased biomass productivity including fish yields, destroys the fish immune system, generalized damage to DNA which causes disturbance of cell functions, damage of biochemical, hematological and histopathological characteristics of fishes.



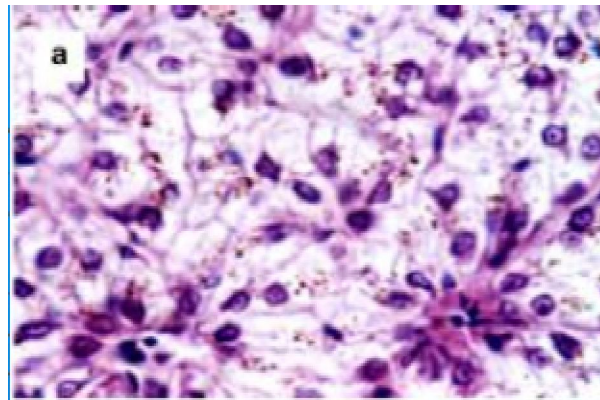
The UVR of 3 h/day exposure for 3 days of *C. gariepinus* led to Erythrocyte haemolysis, enlarged RBC's with irregular shape and very faint cytoplasmic staining indicating the loss of hemoglobin (Fig. 1b-d) in comparison with the control (Fig. 1a) (Sayed *et al.*, 2007).

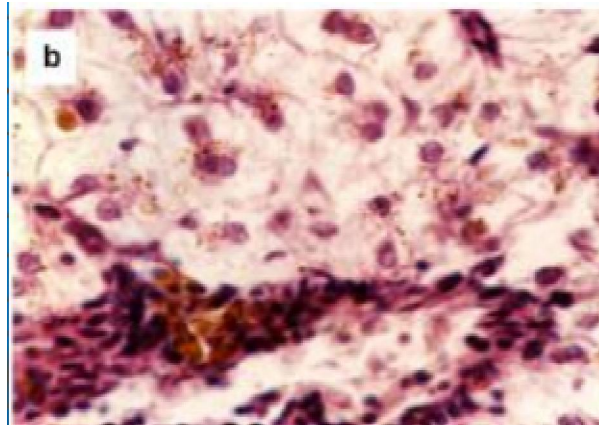


The normal structure of *C. gariepinus* skin is shown in (Fig. 2b). Dorsal side: The UVR of 3 h/day exposure for 3 days led to sever rupture and reduction of the epidermal layer with the destruction of its cells, the alarm cells and the fibroelastic layer, the mucus glands were also severely damaged (Fig. 2a and c) (Sayed *et al.*, 2007).



Ventral side of *C. gariepinus*, the UVR-treated skin to some extent increased in the thickness in comparison with the control (Fig. 3a) with general inflammation and appearing of pyknotic cells (Fig. 3b) (Sayed *et al.*, 2007).





UVR-treated *C. gariepinus* fishes had damaged hepatic tissues with dilated thick-walled blood vessel in association with inflammatory lymphocytic infiltration (Fig. 4b) in comparison with the control (Fig. 4a) (Sayed *et al.*, 2007).

The total protein, ALT, AST increased in comparison with the control whereas, ALP, glucose, cholesterol, RBC's, WBC's, Hb, and blood platelets decreased (Sayed *et al.*, 2007).

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