ECOLOGY

1. - May kill soil micro-organism that decompose humus to release mineral salts
   - Soil structure interfered with encouraging soil erosion.
2. - Drought/food shortage /overgrazing
   - Fire
   - Emigration
3. a) The fish were caught, their age determined and the 2 year olds were retained and their length measured and recorded.
   - This was done repeatedly until a large number were measure; calculation was done by dividing the total length of all fish by the total number of fish.

   b) Lake A has hard water with more calcium while Lake D has soft water with no calcium. Calcium is necessary for bone formation. Fish in Lake A grow faster and greater bone length than fish in Lake D. Lake C has more food which fish eat than Lake D.

   c) Lakes C and D have little or no calcium which is necessary for the formation of the shell in snails.

   d) i) Light temperature, carbon dioxide concentration, oxygen concentration, PH and salinity.

   ii) Light-Affects the rate of photosynthesis.

   Temperature- Affects enzyme activities hence photosynthesis.

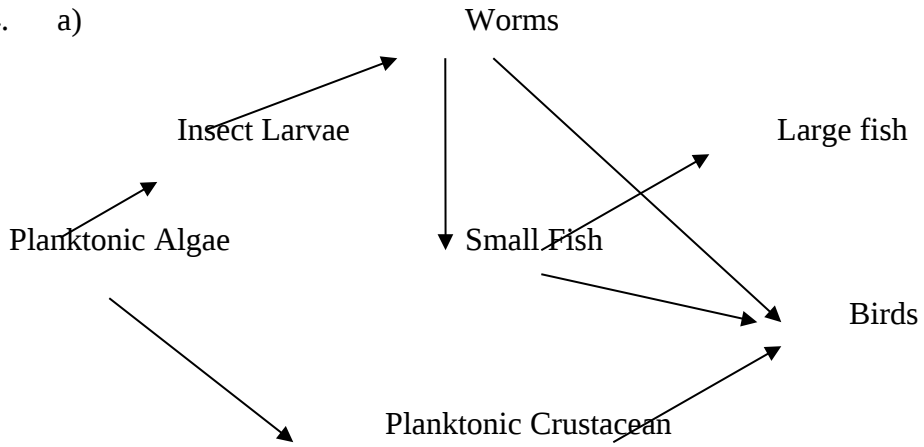
   CO_2 concentration – Determines rate of photosynthesis.

   O_2 Concentration- affects rate of respiration.

   Salinity – Osmoregulation in plants and animals.

PH – Affect enzyme activities.

4. a)



b) i) Planktonic algae → Planktonic crustacean → Birds

ii) Planktonic algae → Planktonic crustacean → Small fish → Large fish

c) Producers must always have a higher biomass than consumers because they support the consumers which are at higher trophic levels

d) i) Pollution – herbicides and pesticides, over fishing, bird hunting

ii) Herbicides and pesticides – kill insect and planktonic algae reducing their number.

- Fishing increases planktonic crustaceans and insect larvae leading to over consumption of algae depleting them.
- Decrease in number of insect larva.

5. i) A- Desert, arid and semi-arid

B- Aquatic, marshy land

6. a) i) 1968

ii) Hot water, sewage and industrial waste.

iii) High temperature reduces dissolved oxygen causing suffocation of

fish.

- Sewage leads to eutrophication reducing oxygen concentration and reduces penetration of light.
- Industrial waste- toxic substance kills the organism.

b) i) A = 7512-20 = $^{7492}/_{5}$

= 1498.4 fish per year

B = 617- 23 = $^{594}/_{5}$

= 118.8 fish per year

Difference = 1379.6 fish per year

ii) - Reproductive rate

- Competition
- Predation
- Sex ratio

c) i) Capture/recapture method

ii) Marks may disappear

During marking fish may be killed

Predation/death may interfere.

7. The pollutants may be absorbed by aquatic plants which in turn may be eaten by fishes. The pollutants therefore get into man through the food chain.

8. - Improving sanitation to prevent infection by parasite.
   - Insecticide to kill vector like mosquitoes or tsetse fly.
   - Avoid indiscriminate sexual intercourse to prevent spread of parasites.

9. a) Green plants → Grasshoppers → Lizards → Snakes

Green plants → Grasshoppers → Lizards → Cats

Green plants → Mice → Snakes → Hawk

Green plants → Mice → Snakes → Cats

b) Mice

c) Lizard, cats, hawk, snakes.

d) Most plants will die

Some organisms will starve and die

Some organisms may migrate.

10. a) Population size

$$N = \frac{374 \times 400}{80} = 1870$$

b) There was even distribution of crabs; No movement in and out of lagoon/on migration. There was random distribution of crabs after first capture

c) Capture, mark, release then recapture/capture/recapture method.

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11. a) Grass → Grasshopper → Guinea fowls

Grass → Termite → Guinea fowls

b) Lions would complete with leopards

Gazelle number would reduce

Grass would be increased

c) Grass

12. a) E -Denitrifying bacteria

J - Nitrifying bacteria

b) F- Nitrogen fixation

H-Decomposition

c) G-Plants

13. a) Community – it is the total number of plants and animals living together in an area.

- Population- total number of organisms of a given species occupying an area at a certain trophic level

b) - Use of net to capture the grasshopper

- Which are then counted and marked. They are then released.

- Total number of grasshoppers is determined by multiplying the grasshoppers captured second time by those captured and marked first time.

- The sum is divided by number of grasshoppers marked in second capture.

14 - During manufacture of sulphuric acid and nitric acids oxide of sulphur and nitrogen are released into air causing acid rain.

- Motor vehicle exhaust fumes release carbon monoxide a respiratory poison.

- Combustion of fuels and coal increase concentration of carbon dioxide creating greenhouse effect.

- Aerosols containing CFC in herbicides and perfumes deplete the ozone layer.

- Smoke from factories mix with fog forming smog which reduces visibility.

- Exhaust fumes from vehicles contains lead from leaded petrol that poisons the body.

- Deforestation exposes top soil to air currents encouraging sheet erosion

- Leaded petrol that poisons the body.
- Loud noise from factories, aeroplanes and Jua Kali workshops can lead to poor hearing ability.
- Radio active emissions can lead to mutations.

15. Curved sharp hooked strong beaks for killing or tearing flesh from bones.

    Curved strong sharp claws for holding prey.

16. a) Crop- potato/tomato

    b) Disease- potato blight/tomatoes rot

    c) - Use of fungicides
    - Uprooting and burning infected plants
    - Crop rotation
    - Use biological control
    - Use disease resistant varieties

17. Cattle are mainly grazers while most wild animals are browsers.

18. a) i) Study of a single species within a community or ecosystem.

    ii) Study of different species of organisms in a natural community in an ecosystem.

    b) A-Aquatic/Fresh water

    B- Forest

    C- Arid- Semi Arid

    c) - Sunken stomata,

    - Reversed rhythm

- Small stomatal pores

19. Entamoeba historical

20. a) Photosynthesis

b) Heterotrophic

c) Aquatic (pond) and terrestrial (forest)

d) Algae → Zooplankton → Small fish → Bird J → Large bird

e) - Number of snails would increase

- Green plants would decrease.

- Bird M would increase

f) In a lower trophic level energy is lost through respiration, excretion and death of some organisms.

g) i) - Vultures

- Decomposers

ii) Vultures- control population of the large birds.

Decomposers- cause decay of dead organisms recycling the nutrients.

h) i) - Deforestation

- Bird hunting

- Over fishing

ii) Removal of the trees destroys the habitat for birds, they therefore migrate.

- Bird hunting kills the birds reducing their number and increasing small fish, mussels and snails.

- Over fishing reduces the number of small fish increasing

zooplankton and reducing the algae

21. - Cells have large air spaces between them to enhance buoyancy.
    - Cells are air filled reducing their density.

22. **Ligh**t- high light intensity increase the rate of photosynthesis

    Temperature- low temperatures lower metabolic activities while moderate temperature increase metabolic activities. High temperature increases transpiration.

    Wind- Strong air current increase rate of transpiration and deforms the plants according to direction of the wind.

    Atmosphere pressure-High pressures decrease the rate of transpiration and also reduces rate of photosynthesis.

    Ph value-some plants thrive well in acid soils while others thrive better in alkaline soils.

    Radioactive radiations- Cause mutations of the offspring

    Oxides of sulphur and nitrogen-cause acid rain that corrodes plant leaves.

23. In different continents, regions with similar climatic conditions and lie in the same latitudes have plants and animals not identical.

24. a) Decomposers – Cause breakdown of organic matter enhancing recycling of nutrients
    b) Predation - The organism feeds on whole or part of another organism and therefore control their population.

25. X- Denitrification

    Y- Animals

    Z- Nitrification

26. Offspring (brown fur) = $^{2}/_{4}$ x 100 = 50%

a) Pyramid of number — Way numbers of individuals occurring at each trophic levels of a food chain may be diagrammatically represented.

Pyramid of biomass — The way the total amount of living matter occurring at each trophic level of food chain may be diagrammatically represented.

b) Loss through excretion e.g. egestion

- Heat
- Respiration

c) Two parallel strings are laid down over a determined length and width within study area.

- No. of organisms in belt transect are counted.
- Area transect is worked out.
- Number of organisms per unit area is worked out.

27. a) Population – It is all members of a given species in a particular habitat at a particular time.

Community – All organisms belonging to different species that interact in the same habitat.

b) i) Capture and recapture method.

ii) Line transect

28. - Produce large number of eggs for increased survival.
- Produce enzymes to digest human skin when penetrating.
- Can withstand low oxygen concentration.
- Have hook-like structures to attach to the intestinal walls.

29. - It is addition of substances into water that may cause harm to organisms and

are destructive to the ecosystem.

The causes of water pollution include;

- Industrial effluents that may be toxic chemicals which may kill the aquatic organisms. It can be controlled by treating the affluent before discharging them.
- Hot water that reduces concentration of oxygen, killing the animals. It is controlled by placing high penalties on factories discharging hot water.
- Oil spillage from oil tankers that reduces oxygen in water, penetration of light intensity and clog feathers of marine birds. It can be controlled by regular servicing of oil tankers.
- Domestic effluents that include;
    - Untreated sewage that causes water borne diseases. It can be controlled by treating sewage before being discharged.
    - Detergents that cause eutrophication causing reduced oxygen concentration. It is controlled by banning phosphate based detergents.
- Agricultural effluents that include;
    - Pesticides and herbicides that have heavy metals that they may gammulates along the food chain killing the higher animals. It is controlled by banning phosphate based detergents.
    - Inorganic fertilizers that have nitrates and sulphates that cause eutrophication. It is controlled by use of organic fertilizers.
- Silting due to soil erosion that reduces penetration of light to the plants and clog respiratory surfaces of animals. It is controlled by proper methods of soil erosion control and proper farming methods.

30. a) It is use of natural predator to kill a prey e.g pest instead of use of pesticide.

b) The aphids are pest found in plants. The ladybirds can be used to control the aphids as they feed on them but not destroy the plants

c) Prey is the source of food for predators. If the number of prey is smaller than the predators they would be depleted.

31. a) Antelopes are grazers while giraffes are browsers.

Antelopes have brown fur being camouflaged by the colour of grass while giraffes are camouflaged by the trees.

b) Trees are camouflage against the herbivores preventing them from being spotted by predators. In open grassland herbivores are easily spotted.

c) The population will first increase leading to competition of resource e.g. food or mates. This causes death of the weak herbivores or migrations to new habitats.

32. - As it gets deeper light penetration decreases reducing rate of photosynthesis hence less productivity.

- As it gets deeper carbon dioxide concentration decrease hence reducing rate of photosynthesis hence less productivity

33. a) Plant protein

b) X-Nitrification

Y-Nitrogen fixation

Z- Dentrification

c) Proteins

34. a) i) 25-10 = 15 birds

ii) 20-5 = 15 birds

b) i) The number of species in forest are more than in the number in the savannah hence higher change.

Fruits more abundant in forest than in savannah

Selectively reduces with forest birds because they are many and competition is stiffer than savannah

ii) Seeds more abundant in savannah than in forest-they they are more exposed but seeds in forest plants are inside the fruit.

Birds in savannah are less selective than forest birds.

c) i) B

ii) - Emigration in big numbers

- High death rate during unsuitable condition and disease.
- Predation increase due to attraction of predator due to their high number.

d) - Bush fire –avoid lighting fires

- Eliminating all predators of one herbivore
- Limited predator to maintain high biological control.
- Felling trees- replanting trees
- Having high concentration of industries that provides that cause acid rain.

Use of fuels that do not produce the oxides.