

## CHAPTER : 14 ECOSYSTEM (KEY POINTS)

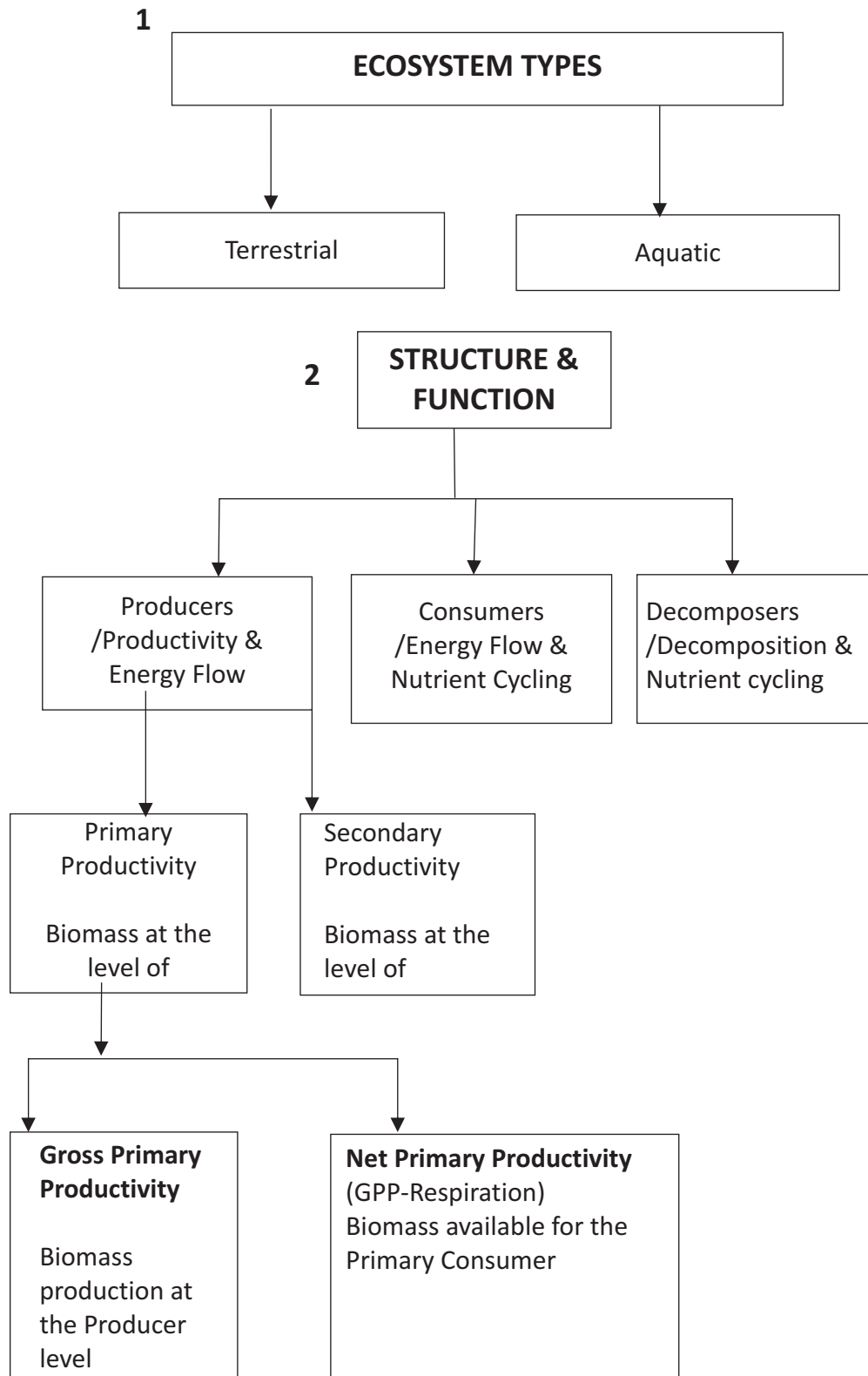
S.N	Term	Explanation
1	Photosynthetic efficiency	Some plants have more efficiency to trap sunlight-sugarcane
2	Ecosystem	The unit including biotic and abiotic components and their interactions .(Coined-Sir A. G. Tansley1935)
3	Abiotic	Non-living (ex. Temp,light, water, utrients)
4	Biotic:	Living organisms (called biota)
5	Functional Components of Ecosystem	1. Productivity, 2. Decomposition 3. Energy flow 4. Nutrient cycling
6	Primary Production	Amount of biomass or organic matter produced per unit area. Over a time period by plants during photosynthesis, expressed in terms of weight (e) or energy (kcal m <sup>-2</sup> ).
7	Productivity	Rate of biomass production-expressed in terms of g <sup>-2</sup> yr <sup>-1</sup> or (kcal m <sup>2</sup> )yr <sup>-1</sup>
8	Gross primary productivity Net primary productivity Secondary productivity	-rate of production of organic matter during photosynthesis-GPP GPP- respiratory loss(R )=NPP-> available to heterotrophs (herbivore & decomposers) Rate formation of new organic matter by consumers
9	Decomposition	Decomposer& break down complex organic matter into inorganic substances like carbon dioxide, water & nutrients
10	Detritus	Dead plant remains such as leaves, bark flowers & dead remains of animals, including faecal matter.-raw material for decomposition, found above & below the ground.
11	Decomposition	Includes Fragmentation, leaching, catabolism, humification & mineralisation
12	Detritivores	Earthworm-breakdown detritus into smaller particles —fragmentation.
13	Process of Decomposition	Fragmentation- Earthworm-breaks down detritus into smaller particles Leaching--Water soluble inorganic nutrients go down into soil horizon, get precipitated as unavailable salts Catabolism-Bacterial & fungal enzymes convert degraded detritus into Inorganic substances(Simpler) Humification-Occur during decomposition in the soil, lead to accumulation of dark coloured amorphous substance resistant to microbial action, undergoes decomposition at extremely slow rate.(Humus)' Mineralisation- Humus degraded by microbes & release inorganic-nutrient
14	PAR	Photosynthetically Active Radiation
15	Producers	Autotrophs-produce organic matter from inorganic matter (producing chemical energy in the form of organic matter)

16	Consumers	Heterotrophs-herbivore-carnivore / that depend on producers or other consumers for food.
17	Decomposers	Fungi & bacteria-heterotrophic organisms that break down( decompose )detritus
18	Saprotrophs	Sapro- meaning decompose; decomposers secrete digestive enzymes that breakdown dead & waste materials into simple, inorganic material-subsequently absorbed by them.
19	Food chain	Transfer of energy from producers to top consumers through a series of organisms, one organism holds only one position in the chain, thereby transferring matter/energy from one level to the next.
20	Food web	No. of food chain interconnected with each other like a web, one organism holds more than one position., there are series of branching lines, competition among different members of different trophic levels.(complex network of many interconnected food chains and feeding relationships_
21	Standing crop	Each trophic level with certain mass of living material at a particular time
22	Seral community	Individual transitional community —seral stage/seral community
23	Climax community	Community that is in near equilibrium with the environment
24	Pioneer community	Species that invade a bare area.
25	Primary succession	Establishment of a biotic community in a newly cooled lava, bare rock, newly created pond or reservoir.-slow processes (In water primary succession Phytoplankton->free floating angiosperm-rooted hydrophytes->sedges grasses-> trees->forest(climax)
26	Secondary succession	It begins in areas where natural biotic communities have been destroyed e.g. abandoned farm land, buried or cut forests. Since soil is available —faster process.
27	Hydrarch succession	Takes place in wetter areas(water bodies)& the series progress from hydric to mesic conditions
28	Xerarch succession	Takes place in dry areas (rocks)& series progress from xeric to mesic conditions.
29	Gaseous cycle	Reservoir-atmosphere; nutrient —gas/vapour; quick/faster cycling eg. C& N2-cycle
30	Sedimentary Cycle	Reservoir-earth crust; Nutrient-nongaseous; slow; e.g. P,S cycle
31	Phosphorous	Make shell, bone, teeth, biological membrane, nucleic acids, cellular energy transfer system.
32	Ecosystem services	Robert Constanza-18 trillion US \$ price tag of Nature's life support services.- '1. Purify air,2.cycle nutrient,3.mitigate droughts .& floods, 4.generate fertile soil,5.provide wild life habitat, 6.Pollinate crop,7.Maintain biodiversity,8.Provide storage site for C, 9.provide aesthetic, cultural & spiritual.

33	Energy flow	Solar energy 100%-->plants 2-10%—>consumers; Energy is transferred in an Ecosystem & in each step food is degraded & major portion lost as heat energy at each step.
34	Lindeman's 10% Law	At each step of food chain when food energy is transferred from one trophic level to the next only 10% of energy is passed on to next level.-(1942).
35	Ecological pyramid	The relation between producers & consumers in an ecosystem —graphically represented in the form of pyramid
36	Pyramid of Number	Relationship between producers & consumers in an ecosystem represented in the form of a pyramid in terms of number.- upright(except tree ecosystem-inverted)
37	Pyramid of Biomass	Relationship between producers & consumers in an ecosystem represented in the form of a pyramid in terms of biomass.(biomass in sea-inverted, e.g.fish-Plankton)
38	Pyramid of energy	Relationship between producers & consumers in an ecosystem represented in the form of a pyramid in terms of flow of energy.- always upright never inverted
39	Ecological succession	Sequential, gradual & predictable changes in the species composition in an area.
40	Sere	Entire sequence of communities that successively changes in a given area.
41	Biome	:Any of the world's major ecosystems, classified according to the predominant vegetation and characterized by adaptations of organisms to that environment.Terrestrial regions inhabited by certain types of life,especially vegetation. eg. Deserts, grassland and forests.
42	Carrying capacity(K)	-maximum population of a particular species that a given habitat can support over a given period of time.
43	Competition	-two or more individual organisms of a single species(intraspecific competition) or two or more individuals of different species (interspecific competition) attempting to use the same /scarce resources in the same ecosystem.
44	Consumer	-organism that cannot synthesize the organic nutrients it needs and gets its organic nutrients by feeding on the tissues of producers or of other consumers;generally divided into primary consumers(herbivores),secondary consumers(carnivores),tertiary(higher-level)consumers,omnivores,and detritivores (decomposers and detritus feeders).
45	Deforestation	-removal of trees from a forested area without adequate replanting.
46	Desert	-biome where evaporation exceeds precipitation and the average amount of precipitation is less than 25centimeters(10inches)ayear.Such areas have little vegetation or have widely spaced ,mostly low vegetation.

47	Desertification	-conversion of rangeland, rain-fed cropland, or irrigated cropland to desertlike land,with a drop in agricultural productivity of10% or more.It is usually caused by a combination of overgrazing,s oilerosion,prolonged drought,and climate change.
48	Ecological niche	-total way of life or role of a species in an ecosystem .It includes all physical,chemical,and biological conditions a species needs to live and reproduce in an ecosystem.
49	Environmental degradation	-depletion or destruction of a potentially renewable resource such as soil, grassland,forest, or wildlife by using it at a faster rate than it is naturally replenished. If such use continues, the resource can become nonrenewable on a human time scale or nonexistent (extinct).
50	Extinction	-complete disappearance of a species from the earth. This happens when a species cannot adapt and successfully reproduce under new environmental conditions or when it evolves into one or more new species (speciation).
51	Forest	-biome with enough average annual precipitation(atleast76centimeters,or30inches) to support growth of various species of trees and smaller forms of vegetation.
52	Grassland	-biome found in regions where moderate annual average precipitation (25to76centimeters,or10to30inches)is enough to support the growth of grass and small plants, but not enough to support large stands of trees.
53	Habitat	-place or type of place where an organism or a population of organisms lives.
54	Keystone species	species that play roles affecting many other organisms in an ecosystem.
55	Limiting factor	-single factor that limits the growth ,abundance, or distribution of the population of a species in an ecosystem.
56	Native species	-species that normally live and thrive in a particular ecosystem.
57	Pioneer community	-first integrated set of plants, animals, and decomposers found in an area undergoing primary ecological succession.
58	Pioneer species	-first hardy species, of microbes, mosses, and lichens, that begin colonizing a site as the first stage of ecological succession.
59	Primary succession	-sequential development of communities in a bare area that has never been occupied by a community of organisms.
60	Secondary succession	-sequential development of communities in an area in which natural vegetation has been removed or destroyed but the soil is not destroyed and has remnants of vegetation.
61	Stratification	Stratification in an ecosystem refers to the vertical distribution of different species occupying different levels

## CHAPTER : 14 ECOSYSTEM (FLOW CHART)



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### ENERGY FLOW FROM SUN TO PRODUCERS TO CONSUMERS

10% law only (10% of the previous level is transferred to the successive level)

Flow is unidirectional  
Loss of energy in the form of heat takes place at each level

Flow is from Producers through the Primary ,secondary, tertiary consumers

Decomposers derive energy from dead bodies of both Producers and consumers

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### Decomposition

Mineralisation(Slow breakdown of humus to release minerals)

Humification(Formation of humus)

Leaching(Inorganic nutrients percolate into the soil)

Catabolism (Action of enzymes on detritus)

Fragmentation by (detritivores)

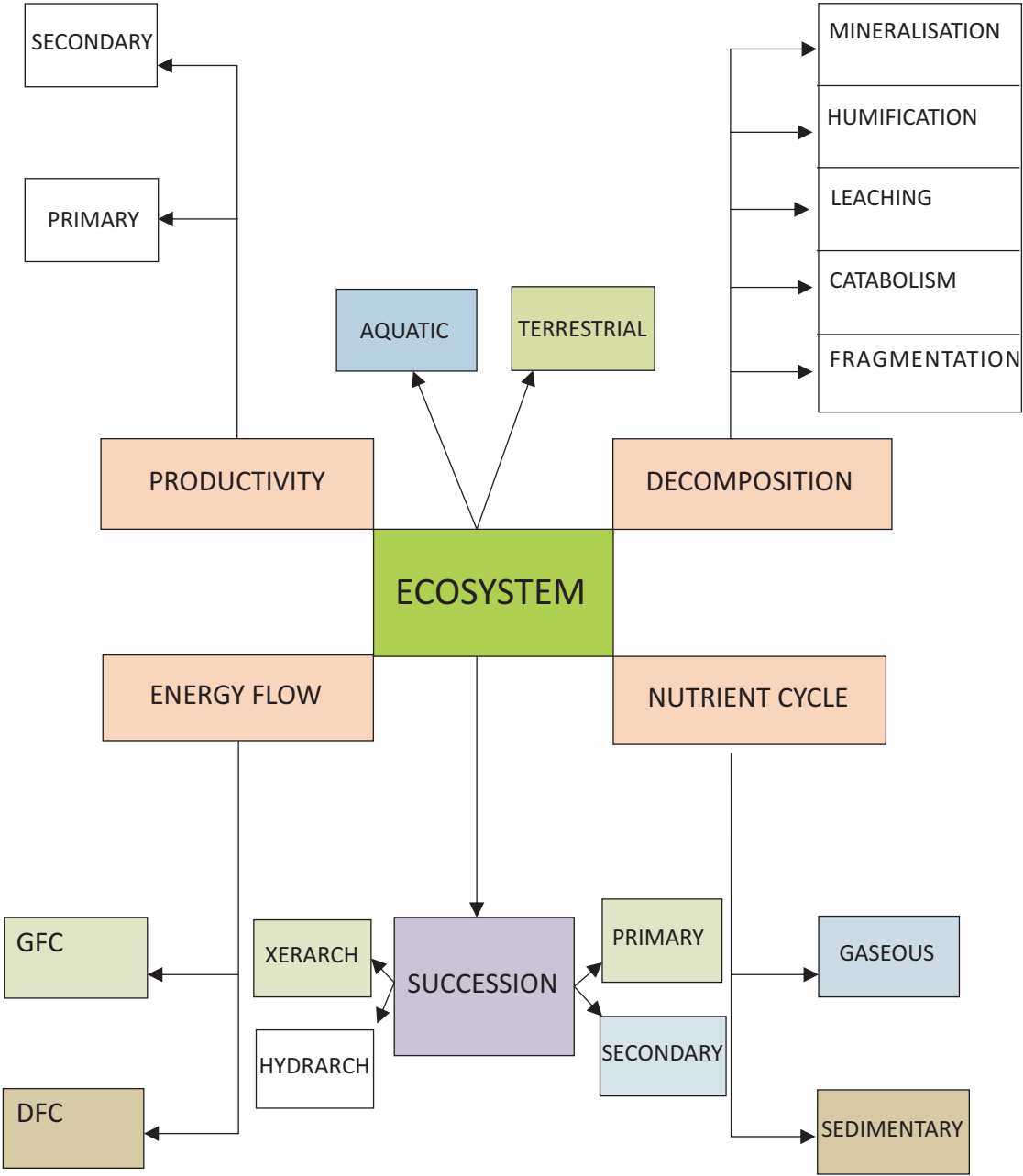
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### FOOD CHAINS

Detritus Food chain  
Begins with detritus

Grazing food Chain  
Begins with Producers

CHAPTER : 14 ECOSYSTEM  
(CONCEPT MAP)



## CHAPTER : 14 ECOSYSTEM (QUESTION BANK)

1. How is a food web formed? 1
2. What is stratification in a forest? 1
3. Define standing crop? How is it measured? 2
4. What is the importance of humus? 2
5. Why is secondary succession faster than primary succession? 2
6. Name the pioneers and climax of primary succession in water and on rocks. 2
7. As succession proceeds the type and number of animals and decomposers also change.
8. Define ecological succession. What is sere? 2
9. What characteristic features are seen in Ecological succession? 2
10. Why is there a restriction on trophic levels in a grazing food chain? Is there such a limitation in the detritus food chain? Explain. 2
11. Schematically show the flow of energy in a grazing food chain from the sun. 2
12. Justify the statement succession and evolution would have been parallel processes at that time when life started on earth. 3
13. In general all pyramids are upright. Explain. What are the exceptions to this generalization? 3
14. What are the limitations of ecological pyramids? 3
15. What are the producers in grass land and oceans. How is GPP different from NPP? Why is the productivity in oceans lesser than on land? 5
16. Why is it reasonable to think that biodiversity should carry a hefty price tag? Justify. 5
17. a, Why are Carbon and Phosphorus essential to living organisms?  
b, What are the natural reservoirs of these elements and in what form?  
c, Give the important differences between the two cycles in nature ? 5
18. With a flow chart explain the process of decomposition. What factors affect this process? (5)
19. What are the major functions of an ecosystem. How do the structural components work as a unit to perform the function? (5)
20. Humans do a disservice to nature by creating a desert from a forest. Comment and say why should it be a cause of concern? (4)



## CHAPTER 14 – ECOSYSTEM

### (ANSWER KEY)

Q No.	HINTS	Marks
1	Interconnecting foodchains/one organism in different trophic levels	1
2	The vertical levels of trees in a forest	1
3	The mass of living matter at a given time measure of biomass ,dry weight of living matter at a given time	1+1
4	The colloidal matter resistant to microbial action ,reservoir of nutrients,breaks down slowly	1+1
5	Soil already formed,spores,seeds remnants of vegetation	$\frac{1}{2}+\frac{1}{2}$
6	Phytoplanktons and forest,lichens and forest	$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$
7	Vegetational changes, affect food and shelter for various types of animals	1+1
8	Gradual fairly predictable change, in the species composition of a given area.The entire sequence of communities that change in a given area during the succession	1+1
9	There is increase in diversity,species increase and increase in number,increase in biomass	$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$
10	Energy decreases with successive levels. 10% only transferred to next level.	1+1
11	Sun----1%----- plants----2-10%-----herbivores-----10%-----carnivore	$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$
12	Succession starts from the pioneer species giving way to seral communities before establishing the climax.Evolution also involves change of environmental factors followed by change in the communities containing fittest species	1+1+1
13	The producers are the most ,in terms of energy,biomass and number and subsequent levels are fewer in number,energy and Biomass .Energy decreases with successive levels, The pyramid of Biomass in the oceans and pyramid of number in the case of a fruiting tree supporting hundreds of consumers ,the pyramids can be inverted.	1+1+1
14	Decomposers are not taken into account,two trophic levels may be taken up by the same species which is not considered,a food wb is not accomodated	1+1+1
15	Grass,phytoplanktons,GPP is the rate of Biomass production /g/yr whereas NPP is the rate of Biomass converted into plant matter and available for the consumers (NPP=GPP-Respiration),Oceans have less solar energy available compared to land hence productivity is lower.	1+1+1
16	Ecosystem services include 1) maintaining soil 2) regulating rainfall 3) preventing erosion of soil,4) pollination 5)providing materials of medicinal,food and other values	1+1+1+1+1
17	Carbon part of all organic compounds ,Phosphorus for ATP,DNA etc Gaseous-Reservoir in atmosphere,Nitrogen cycle b)Sedimentary-Soil,eg-phosphorus. No gaseous component in phosphorus and reservoirs of the two are atmosphere and sediments respectively	1+2+2
18	Breakdown of complexorganicmatterbydecomposers.a)Process-i)fragmentation ii)leachingiii)catabolism.Humificationandmineralization–humificationleadsto accumulationofdarkcolours substancecalledhumus.Mineralisationresultinreleaseof inorganic substances a)climaticfactor– i)tempii)soilb)chemicalqualityofdetritus.Highertempandmoist condition – high rate of decomposition.Drysoil ,High temp–Lowrate	2 $\frac{1}{2}$ +2 $\frac{1}{2}$
19	Productivity-producers,nutrient cycling and energy flow through the food chains-GFC & DFC,decomposition by the detritivores and decomposers	1+1+1+1+1
20	Ecosytem services include regulating the climate,hence livelihood and food of animals and people. Conversion of range land fedcropland, rainorirrigated cropland to desert like and,withadropinagriculturalproductivityof10%ormore.Itisusuallycausedbya combination ofovergrazing,soilerosion,prolongeddrought,and climatechange. The soil becomes unsuitable for crops and vegetation food would also become scarce besides water and oxygen.	1+1+1+1