FREE NOTES · NCERT + NEET LEVEL

Eco system

Ecosystem ki banawat aur kaam, productivity, decomposition, energy flow, food chains aur webs, ecological pyramids, aur ecological succession.

01 Ecosystem: banawat aur kaam
02 Productivity
03 Decomposition
04 Energy flow aur food chains
05 Ecological pyramids
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01 Ecosystem: banawat aur kaam

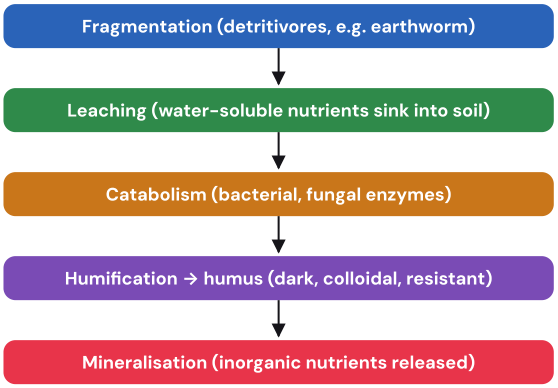
- Prakriti ki functional unit jahan jeev aapas me aur bhautik mahaul se interact. Zameeni (jungle, ghaas ka maidaan, registaan) aur paani wale (talaab, jheel, wetland, nadi, estuary); insaan ke banaye: khet, aquarium.
- Banawat: biotic aur abiotic; **stratification** (oopar-neeche: ped oopar, jhaadiyan, neeche ghaas).
- Chaar kaam: productivity, decomposition, energy flow, nutrient cycling.
- Talaab: abiotic (paani, mitti), producers (phytoplankton, algae, tairte/doobe/kinaare ke paudhe), consumers (zooplankton, tairne aur tal pe rehne wale jaanwar), decomposers (fungi, bacteria, flagellates).

02 Productivity

- **Primary production**: paudhon dwara per area per samay biomass (g m^{-2} ya kcal m^{-2}); rate = **productivity** (g m^{-2} yr^{-1}).
- **GPP** = photosynthesis me organic matter banne ki rate. **NPP = GPP − R** (respiration loss); NPP heterotrophs ke liye.
- **Secondary productivity**: consumers dwara naya organic matter banne ki rate.
- Poore biosphere ka saalana NPP ~170 arab tonne (dry weight); samudra (70% surface) sirf ~55 arab tonne.

03 Decomposition

- Decomposers jatil organic matter ko inorganic (CO_2, paani, nutrients) me todte. Kachcha maal = **detritus** (sookhe patte, chaal, phool, mare jaanwar, mal).
- Rate detritus ke chemicals (lignin, chitin zyada = dheema; nitrogen, ghulne wali shakkar zyada = tez) aur mausam (garam, nam = tez; thanda, anaerobic = dheema) pe.
- Humus bahut dheere tootta; nutrients ka bhandaar.

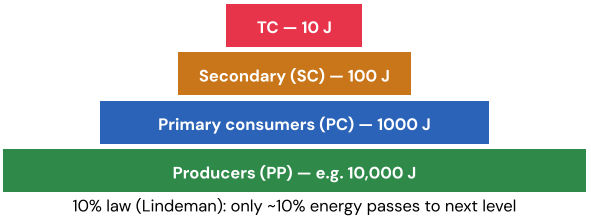


Decomposition ke steps

04 Energy flow aur food chains

- Suraj hi energy ka akela srot (gehre samudra ke hydrothermal ecosystems chhodkar). Aane wali dhoop ka 50% se kam **PAR**; paudhe PAR ka sirf 2–10% pakadte.
- Energy flow **ek disha** me (suraj → producers → consumers); thermodynamics ka doosra niyam.
- **Grazing food chain (GFC)**: ghaas → bakri → insaan. **Detritus food chain (DFC)**: mare organic matter se; decomposers (saprotrophs). Paani me GFC mukhya; zameen pe DFC se zyada energy.
- **Food web**: judi hui food chains. Trophic levels: producers (1st), herbivores (2nd), carnivores (3rd, 4th). **Standing crop**: kisi samay ek trophic level ka biomass.

05 Ecological pyramids

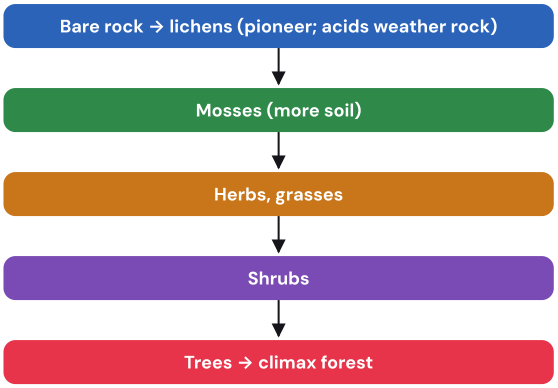


Pyramid of energy (hamesha seedha)

- Teen types: number, biomass, energy. Base = producers.
- Pyramid of **energy** hamesha seedha (har step pe garmi me energy loss).
- **Numbers** ka pyramid ped ecosystem me ulta (ek ped, kai keede). **Biomass** ka pyramid samudra me ulta (thoda phytoplankton bahut machhliyon ko paalta).
- Kamiyan: ek species ka kai trophic levels pe hona nahi maanta; saral food chain maanta; saprophytes ko jagah nahi jabki zaroori.

06 Ecological succession

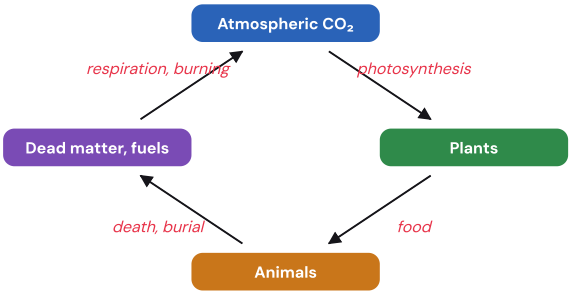
- Kisi area me species ka dheere, anumaan lagaane layak badlav ⇒ **climax community** (mahaul ke saath santulan). Communities ka kram = **sere**; har ek = seral stage.
- **Primary succession**: jahan jeevan nahi tha (nangi chattan, thandi lava, naya talaab); bahut dheema. **Secondary succession**: jahan jeevan tha par khatam hua (chhoda khet, jala/kata jungle, baadh wali zameen); tez (mitti hai).
- **Hydrarch** (paani me: phytoplankton → doobe paudhe → tairte → reed swamp → marsh-meadow → scrub → jungle) aur **xerarch** (sookhe area); dono **mesic** (madhyam paani) climax tak.
- Chattan pe pioneer: lichens; paani me: phytoplankton.



Nangi chattan pe primary succession (xerarch)

07 Extra: nutrient cycling + ecosystem services

- Nutrients ghoomte; energy nahi. **Standing state** = kisi samay mitti me nutrients ki matra.
- **Gaseous cycles** (bhandaar vaayumandal: carbon, nitrogen) vs **sedimentary cycles** (bhandaar dharti ki parat: phosphorus, sulphur).
- Carbon: jeevon ke dry weight ka ~49%; duniya ka 71% carbon samudra me ghula; photosynthesis se saal me ~4 × 10^{13} kg fix.
- Phosphorus: chattanon ke tootne se; CO_2 ki tarah saans se hawa me nahi jaata.
- **Ecosystem services**: hawa-paani saaf, pollination, mitti banna, nutrient cycling, jeevon ka ghar. Robert Costanza ne ~**US$ 33 trillion** saal ka anumaan diya (mitti banna ~50%).



Carbon cycle (saral)

08 Important Q&A

Q1. GPP 100 aur respiration loss 30 ho to NPP?

NPP = 100 − 30 = 70 kcal m^{-2} yr^{-1}.

Q2. Energy pyramid hamesha seedha kyun?

Har transfer me sirf ~10% aage; baaki garmi me khatam, isliye upar energy kam.

Q3. Secondary succession primary se tez kyun?

Mitti aur kuch jeev/beej pehle se maujood.

09 Common mistakes

- Samudra me biomass pyramid seedha kehna (ulta).
- Energy flow ko cyclic sochna (ek disha; nutrients cycle).
- NPP = GPP + R likhna.
- Humus ko jaldi tootne wala kehna.

10 Practice (NEET style)

1. Nangi chattan pe pioneer?
2. Paudhe PAR ka kitna?
3. Numbers ka ulta pyramid?
4. NPP formula?
5. 10% law kisne?

ANSWERS

1) Lichens · 2) 2–10% · 3) Tree ecosystem · 4) GPP − R · 5) Lindeman

11 Quick revision: exam se 5 minute pehle

PRODUCTIVITY

- NPP = GPP − R
- Biosphere NPP ~170 bn t
- Samudra ~55 bn t

DECOMPOSITION

- Fragmentation → leaching → catabolism
- Humification, mineralisation
- Garam nam = tez

ENERGY

- Ek disha, 10% law
- GFC vs DFC
- Energy pyramid hamesha seedha

SUCCESSION

- Primary dheema, secondary tez
- Lichens / phytoplankton pioneer
- Mesic climax

Koi doubt? padhaiadda.netlify.app pe AI Doubt Solver se poocho, ya is chapter ka mock test do.