FREE NOTES · NCERT + NEET LEVEL

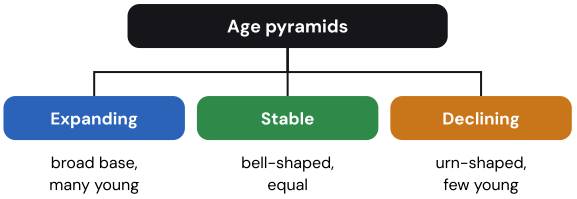
Organisms & Populations

Populations: gun, growth (exponential aur logistic), life history variation, aur population interactions (predation, competition, parasitism, commensalism, mutualism).

01 Population ke gun
02 Population growth
03 Life history variation
04 Population interactions
05 Predation aur competition vistar se
06 Parasitism aur mutualism vistar se
07 Extra: organism aur mahaul (NEET)
08 Important Q&A
09 Common mistakes
10 Practice (NEET style)
11 Quick revision

01 Population ke gun

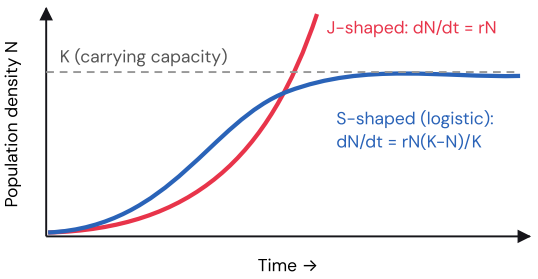
- Population = ek area me ek species ke jeev jo resources baantte aur aapas me prajanan karte. Jo gun ek jeev me nahi: **birth rate**, **death rate**, **sex ratio**, **age distribution**.
- Birth aur death rate per capita: jaise pichhle saal 20 kamal, 8 naye ⇒ birth rate = 8/20 = 0.4 per kamal per saal.
- Age pyramids (pre-reproductive, reproductive, post-reproductive) batate population badh rahi, sthir ya ghat rahi.
- Density: sankhya, percent cover (paudhe), biomass, indirect (baagh ke pug marks, faecal pellets), relative density (trap me machhliyan).



Age pyramids ke shape

02 Population growth

- Density badhti **natality** (B), **immigration** (I) se aur ghatti **mortality** (D), **emigration** (E) se: $N_{t+1} = N_t + [(B + I) - (D + E)]$.
- **Exponential** (asimit resources): $dN/dt = rN$; $N_t = N_0e^{rt}$; **J-shaped**. r = intrinsic rate of natural increase (Norway rat 0.015, flour beetle 0.12; Bharat 1981 r = 0.0205).
- **Logistic** (seemit resources): $dN/dt = rN(K - N)/K$; **sigmoid**; K = carrying capacity. Phases: lag, acceleration, deceleration, asymptote. Zyada asli (Verhulst–Pearl).



Exponential vs logistic growth

03 Life history variation

- Populations apne habitat me **reproductive fitness** (Darwinian fitness, zyada r) badhane ke liye evolve.
- Kuch zindagi me ek baar (Pacific salmon, baans); kuch kai baar (zyada birds, mammals). Kuch bahut chhote bachche (oysters, pelagic fishes); kuch kam bade (birds, mammals).
- Life history traits habitat ki abiotic aur biotic seemaon ke hisaab se evolve.

04 Population interactions

Interaction	Species A	Species B	Example
Mutualism	+	+	Lichen (fungus + alga), mycorrhiza, anjeer–wasp, orchid *Ophrys*–madhumakkhi (sexual deceit)
Competition	-	-	Flamingo aur machhli zooplankton ke liye; Abingdon kachhua aur bakriyan (Galapagos)
Predation	+	-	Baagh–hiran; Australia me prickly pear cactus ek moth se control
Parasitism	+	-	Amarbel (Cuscuta) jhaadiyon pe; liver fluke; insaan pe joon; kauve ke ghonsle me koyal ke ande (brood parasitism)
Commensalism	+	0	Aam ki daal pe orchid; whale pe barnacles; cattle egret aur gaay; sea anemone–clown fish
Amensalism	-	0	Penicillium bacteria ko rokta

05 Predation aur competition vistar se

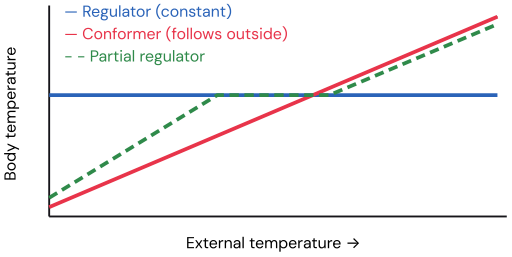
- Predators trophic levels me energy le jaate, prey ki sankhya control, species diversity bachate (starfish *Pisaster* hataane se 10+ invertebrate species vilupt: Paine ka experiment).
- Prey ki suraksha: camouflage (mendhak), zehar (Monarch titli caterpillar me khaye weed ke chemical se kadvi), kaante (*Acacia*, cactus), chemicals (*Calotropis* cardiac glycosides; nicotine, caffeine, quinine, strychnine, opium suraksha ke liye).
- **Gause ka competitive exclusion principle**: same resources ke liye ladne wali do milti-julti species hamesha saath nahi reh sakti; kamzor khatam.
- **Resource partitioning**: MacArthur: 5 warbler species ek ped ke alag hisson pe khaakar saath rehti.
- Interference competition: resources kaafi hon tab bhi ek species doosre ki khaane ki kshamta ghataati.

06 Parasitism aur mutualism vistar se

- Parasites host-specific, host ke saath co-evolve; adaptations: bekaar sense organs khatam, chipakne wale organs/suckers, digestive system khatam, zyada prajanan. Kai ke jatil life cycle intermediate hosts ke saath (human liver fluke: ghongha aur machhli).
- **Ectoparasites** (joon, ticks, machhli pe copepods, bina chlorophyll ka *Cuscuta*) vs **endoparasites** (host ke andar). Brood parasitism: koyal ke ande kauve ke ande jaise.
- Mutualism: pollination aur beej failane me paudhe–jaanwar; har anjeer species ka apna wasp partner (wasp phal me ande deta, larva beej khaate). Mediterranean orchid *Ophrys*: petal maadaa madhumakkhi jaisi; nar madhumakkhi pseudocopulation karke pollen le jaata.

07 Extra: organism aur mahaul (NEET)

- Mukhya abiotic factors: **temperature** (eurythermal = badi range; stenothermal = kam), **paani** (euryhaline / stenohaline namak sahna), **roshni**, **mitti**.
- Jawaab: **regulate** (pakshi, mammals: homeostasis), **conform** (zyada jaanwar, saare paudhe), partial regulators, **migrate** (Siberian sarus Keoladeo, Bharatpur), **suspend** (bhaalu ka hibernation, ghonghe/machhli ka aestivation, zooplankton ka diapause, beej ki dormancy).
- Chhote jaanwar polar areas me kam: surface area : volume zyada, garmi jaldi jaati.



Regulators vs conformers

- Adaptations: **kangaroo rat** (andar ki fat oxidation se paani, gaadha urine); registaani paudhe: moti cuticle, dhanse stomata, CAM, patte → kaante (*Opuntia*); **Allen's rule**: thande ilaakon ke mammals ke kaan aur pair chhote; seals me blubber.
- Oonchaai ki bimari (ulti, thakan, dhadkan): O_2 kam; body zyada RBC banati, Hb ki O_2 pakad kam, saans tez.
- 100 °C se garam jharnon me archaebacteria; Antarctic ke 0 °C se thande paani me machhli.

08 Important Q&A

Q1. Talaab me 20 Hydrilla; saal me 8 naye. Birth rate?

8/20 = 0.4 per paudha per saal.

Q2. Logistic growth zyada asli kyun?

Resources hamesha seemit; N carrying capacity K ke paas aane pe growth dheemi.

Q3. Gause ka competitive exclusion principle?

Same seemit resources ke liye do milti-julti species hamesha saath nahi reh sakti; kamzor khatam.

09 Common mistakes

- Aam pe orchid ko parasitism kehna (commensalism).
- Logistic ko J-shaped likhna (S-shaped).
- Kehna ki immigration population ghatata.
- Amensalism (−,0) aur commensalism (+,0) mix karna.

10 Practice (NEET style)

1. Exponential growth ki equation?
2. Sea anemone ke saath machhli?
3. Brood parasite pakshi?
4. Population ki upari seema?
5. Sexual deceit wala orchid?

ANSWERS

1) dN/dt = rN · 2) Clown fish (commensalism) · 3) Cuckoo (koel) · 4) Carrying capacity K · 5) *Ophrys*

11 Quick revision: exam se 5 minute pehle

POPULATION

- Birth, death, sex ratio, age
- Age pyramids: expanding/stable/declining

GROWTH

- J: dN/dt = rN
- S: rN(K−N)/K
- K = carrying capacity

INTERACTIONS

- Mutualism ++, competition −−
- Predation, parasitism +−
- Commensalism +0, amensalism −0

KEY NAMES

- Gause exclusion
- MacArthur warblers
- Paine Pisaster

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