Source-sink dynamics

- Source–sink dynamics is a theoretical model used by ecologists to describe how variation in habitat quality may affect the population growth or decline of organisms.
- Since quality is likely to vary among patches of habitat, it is important to consider how a low quality patch might affect a population.
- In this model, organisms occupy two patches of habitat.

1. One patch, the source, is a high quality habitat that on average allows the population to increase.
2. The second patch, the sink, is very low quality habitat that, on its own, would not be able to support a population.

- However, if the excess of individuals produced in the source frequently moves to the sink, the sink population can persist indefinitely. Organisms are generally assumed to be able to distinguish between high and low quality habitat, and to prefer high quality habitat.
- However, ecological trap theory describes the reasons why organisms may actually prefer sink patches over source patches.
- Finally, the source-sink model implies that some habitat patches may be more important to the long-term survival of the population, and considering the presence of source-sink dynamics will help inform conservation decisions.

- Recently tiger surveys in India has shown the tiger population in the source-sink in the ratio of 60:40. 33% of the tiger population in India lives outside its source i.e, tiger reserves.
- It moves towards the sink due to decline in the capacities for the tiger reserves to further hold the tiger population. 17/50 tiger reserves in India are going to achieve its maximum capacity to hold the tiger populations.

Ecological traps

- Ecological traps are scenarios in which rapid environmental change leads organisms to prefer to settle in poor-quality habitats.
- The concept stems from the idea that organisms that are actively selecting habitat must rely on environmental cues to help them identify high-quality habitat.
- If either the habitat quality or the cue changes so that one does not reliably indicate the other, organisms may be lured into poor-quality habitat.
- Ecological traps are thought to occur when the attractiveness of a habitat increases disproportionately in relation to its value for survival and reproduction.
- The result is preference of falsely attractive habitat and a general avoidance
of high-quality but less-attractive habitats.

For example, Indigo buntings typically nest in shrubby habitat or broken forest transitions between closed canopy forest and open field. Human activity can create 'sharper', more abrupt forest edges and buntings prefer to nest along these edges. However, these artificial sharp forest edges also concentrate the movement of predators which predate their nests. In this way, Buntings prefer to nest in highly altered habitats where their nest success is lowest.