Q3. Role of local communities & traditional knowledge in biodiversity conservation

(Prepared for Earth-science students)

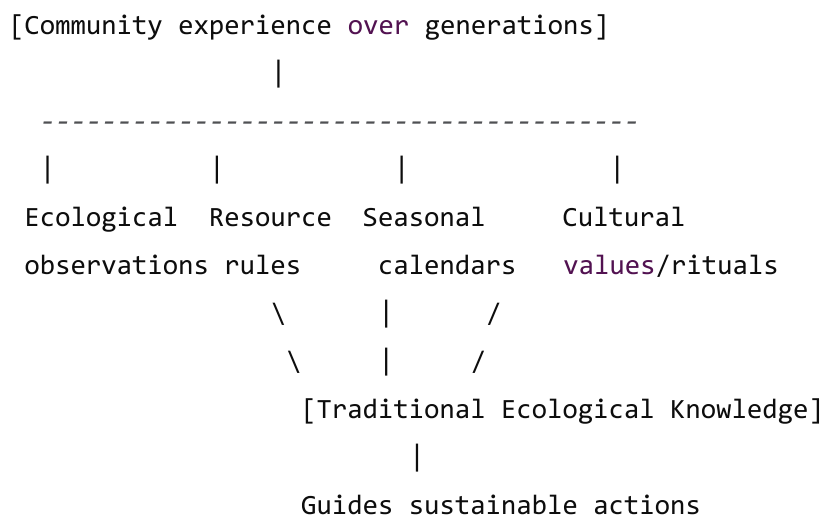
(a) Define traditional ecological knowledge (TEK). (3 marks)

Definition (short, exam style):
Traditional Ecological Knowledge (TEK) is the cumulative, place-based knowledge, practices and beliefs about relationships between organisms and their environment that indigenous and local communities develop through long-term interaction with a landscape. TEK combines ecological observations, resource-use rules, seasonal calendars, and cultural values that guide sustainable use and stewardship.

Key characteristics (concise):

- **Place-based & long-term** — tied to specific landscapes and transmitted across generations.
- **Practical & adaptive** — embedded in everyday resource practices (harvesting, fire, water management) and adjusted by experience.
- **Holistic & multi-scale** — links soil, water, climate, species and people.
- **Oral & experiential** — knowledge preserved in stories, rituals, taboos and practice, not only written records.

Schematic (TEK at a glance):



(b) Examples where local communities have contributed to conservation. (4 marks)

1. Sacred groves & community forests
Small patches protected for cultural/religious reasons often retain high native biodiversity and act as seed sources and refuges within altered landscapes (helps maintain species and gene pools).

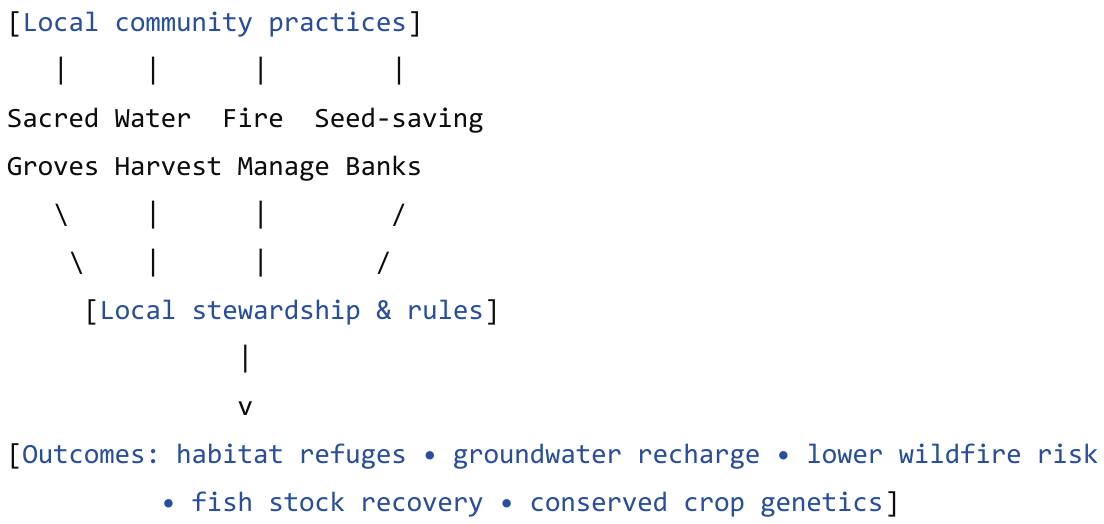
2. Traditional water-harvesting (e.g., tanks, terraces, johads, qanats)
Local systems stabilize soils, recharge groundwater, maintain wetlands and microclimates—supporting aquatic and riparian biodiversity and reducing erosion.

3. Indigenous fire management (patch burning)
Planned low-intensity burns by indigenous fire managers reduce fuel loads, maintain open habitats that support fire-adapted species, and lower catastrophic wildfire risk.

4. Community-managed marine closures / fisheries taboos
Locally enforced seasonal or area closures allow fish stocks and coral to recover, increasing long-term yields and reef resilience.

5. On-farm agrobiodiversity (landraces & seed banks)
Farmers maintain diverse crop varieties adapted to local soils, climate and pests, conserving genetic diversity essential for resilience and future breeding.

Schematic (community practices → conservation outcomes):



(c) Ways to integrate traditional knowledge with modern conservation strategies. (3 marks)

Actionable suggestions (clear, exam-friendly):

1. **Participatory co-management:** formalize joint decision-making (communities + state + scientists) for protected areas, fisheries and forests so TEK informs management plans.
2. **Document & map TEK (with consent):** create People's Biodiversity Registers, participatory GIS maps and seasonal calendars—useful for spatial planning and monitoring.
3. **Co-produce science:** combine TEK observations (phenology, species behaviour) with scientific monitoring (remote sensing, biodiversity surveys) to improve models and early warning.
4. **Legal recognition & ABS:** recognize customary rights, protect intellectual property, and ensure fair benefit-sharing for knowledge holders.

5. **Adaptive hybrid management:** design interventions that test TEK-informed practices alongside scientific controls, then iterate using monitoring.
6. **Capacity building & reciprocal learning:** train community members in basic monitoring/GIS while scientists learn local indicators and practices; include TEK in curricula and outreach.

Schematic (integration pathway):