



Mains Practice Question

Q. How do Himalayan rivers maintain their flow throughout the year while peninsular rivers show significant seasonal variations?(**150 words**)

13 Jan, 2025 GS Paper 1 Geography

Approach

- Introduce the answer by differentiating Himalayan rivers and Himalayan rivers
- Give Geographical Factors responsible for Year-Round Flow of Himalayan Rivers vs Seasonal Variations of Peninsular Rivers
- Conclude suitably.

Introduction

Himalayan rivers, such as the **Ganga**, **Yamuna**, and **Brahmaputra**, maintain perennial flow, whereas **Peninsular rivers** like the **Godavari**, **Krishna**, and **Mahanadi** exhibit seasonal variations in their discharge. These differences arise due to distinct geographical, climatic, and hydrological factors that influence their regimes.

Body

Geographical Factors: Himalayan vs Peninsular Rivers' Flow:

- **Source of Origin and Water Supply**
 - **Himalayan Rivers:** These rivers originate from **glaciers and snow-fed regions** in the Himalayas, ensuring a continuous water supply throughout the year.
 - **Examples:** The **Ganga** originates from the **Gangotri Glacier**, and the **Brahmaputra** from the **Chemayungdung Glacier** in Tibet.
 - During summer, melting glaciers significantly contribute to their flow, compensating for reduced rainfall.
 - **Peninsular Rivers:** Most peninsular rivers are **rain-fed**, relying heavily on the **southwest monsoon** for their water supply.
 - **Examples:** The **Godavari** originate from **Trimbakeshwar in the Western Ghats**, and the **Krishna** from **Mahabaleshwar** in Maharashtra.
 - In non-monsoon months, these rivers often dry up or experience reduced flow due to the absence of alternative water sources.
- **Climatic Influence**
 - **Himalayan Rivers:** The **humid and subtropical climate** in the Himalayan region ensures a steady supply of precipitation, including **snowfall in winter** and **rainfall during the monsoon**.
 - **Examples:** Tributaries of the Ganga, such as the **Kosi** receive rainfall from the high-rainfall areas of the **Terai** region.
 - **Peninsular Rivers:** The **semi-arid to tropical climate** in peninsular India results in pronounced seasonality.
 - **Examples:** Rivers like the **Cauvery** and **Tungabhadra** experience high discharge

during the **southwest monsoon** but show significant reductions in the dry seasons.

▪ **Catchment and Geology**

- **Himalayan Rivers:** The **large catchment areas** of these rivers and their extensive **tributary networks** allow for efficient water collection.
 - **Examples:** The **Brahmaputra** has large tributaries like the **Dibang** and **Lohit**, ensuring a vast catchment area.
 - The young and **tectonically active Himalayas** are prone to erosion, contributing to high sediment loads that sustain flow.
- **Peninsular Rivers:** These rivers have **smaller catchments** and originate from ancient, stable geological formations with **hard crystalline rocks**, limiting groundwater recharge.
 - Seasonal rainfall drains quickly due to the hard terrain and limited permeability.

▪ **Human Interventions**

- **Himalayan Rivers:** The perennial nature of Himalayan rivers makes them suitable for **irrigation and hydroelectric projects**, helping to regulate flow.
 - **Examples:** The **Tehri Dam** on the Bhagirathi and the **Farakka Barrage** on the Ganga manage flow for irrigation and navigation.
- **Peninsular Rivers:** Over-reliance on monsoon-fed rivers for **irrigation and drinking water** exacerbates their seasonal nature.
 - **Examples:** The **Hirakud Dam on the Mahanadi** often faces low storage levels during dry seasons.

Conclusion

Himalayan rivers maintain their **perennial nature due to glacial melt, large catchments, and favorable climatic conditions**, while peninsular rivers face seasonal variations due to monsoon dependence, geological constraints, and smaller catchments. These differences underline the **need for effective water resource management**, such as **river interlinking, to mitigate disparities and ensure sustainable water availability**.

Alternatively, the body section can be presented in tabular format:

Aspect	Himalayan Rivers	Peninsular Rivers
Source of Origin and Water Supply	Originate from glaciers and snow-fed regions in the Himalayas, ensuring perennial flow.	Rain-fed, relying heavily on the southwest monsoon, resulting in seasonal water supply.
	Examples: Ganga from Gangotri Glacier; Brahmaputra from Chemayungdung Glacier.	Examples: Godavari from Trimbakeshwar; Krishna from Mahabaleshwar.
	Melting glaciers during summer sustain flow, even with reduced rainfall.	Dry up or experience reduced flow in non-monsoon months due to lack of alternative water sources.
Climatic Influence	Humid and subtropical climate ensures steady precipitation, including winter snowfall and monsoon rains.	Semi-arid to tropical climate leads to pronounced seasonality with high monsoon discharge and dry-season flow.
	Examples: Ganga tributaries (e.g., Kosi) receive rainfall from the Terai region.	Examples: Cauvery and Tungabhadra show significant flow reductions in dry seasons.
Catchment and Geology	Large catchments with extensive tributary	Smaller catchments, originating from ancient, stable geological

	networks, supported by young, tectonically active Himalayas.	formations with hard crystalline rocks.
	Examples: Brahmaputra has vast tributaries like Dibang and Lohit, sustaining flow.	Seasonal rainfall drains quickly due to hard terrain and limited permeability.
Human Interventions	Perennial flow supports irrigation and hydroelectric projects, enabling flow regulation.	Seasonal flow limits utility for irrigation and drinking water during dry seasons.
	Examples: Tehri Dam on Bhagirathi; Farakka Barrage on Ganga for irrigation and navigation.	Examples: Hirakund Dam on Mahanadi often faces storage issues during dry seasons.

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