ATMOSPHERIC RIVERS - GEOGRAPHY

News: *Heavy rains and floods have recently affected several parts of India, killing scores and displacing thousands. These floods are exacerbated by* ***"flying rivers," or atmospheric rivers.***

What's in the news?

Long, narrow bands of water vapour in the atmosphere that transport moisture from the tropics to other regions. These **"rivers in the sky"** can be thousands of kilometres long and hundreds of kilometres wide, carrying large amounts of water vapour. When they make landfall, **they can release this moisture as heavy rain or snow**, often leading to significant flooding and other weather-related impacts.

Atmospheric rivers occur globally, affecting the west coasts of the world's major landmasses. A well-known example is the **"Pineapple Express**," a strong atmospheric river that is capable of bringing moisture from the tropics near Hawaii over to the U.S. West Coast.

The main characteristics or defining features of the Atmospheric Rivers

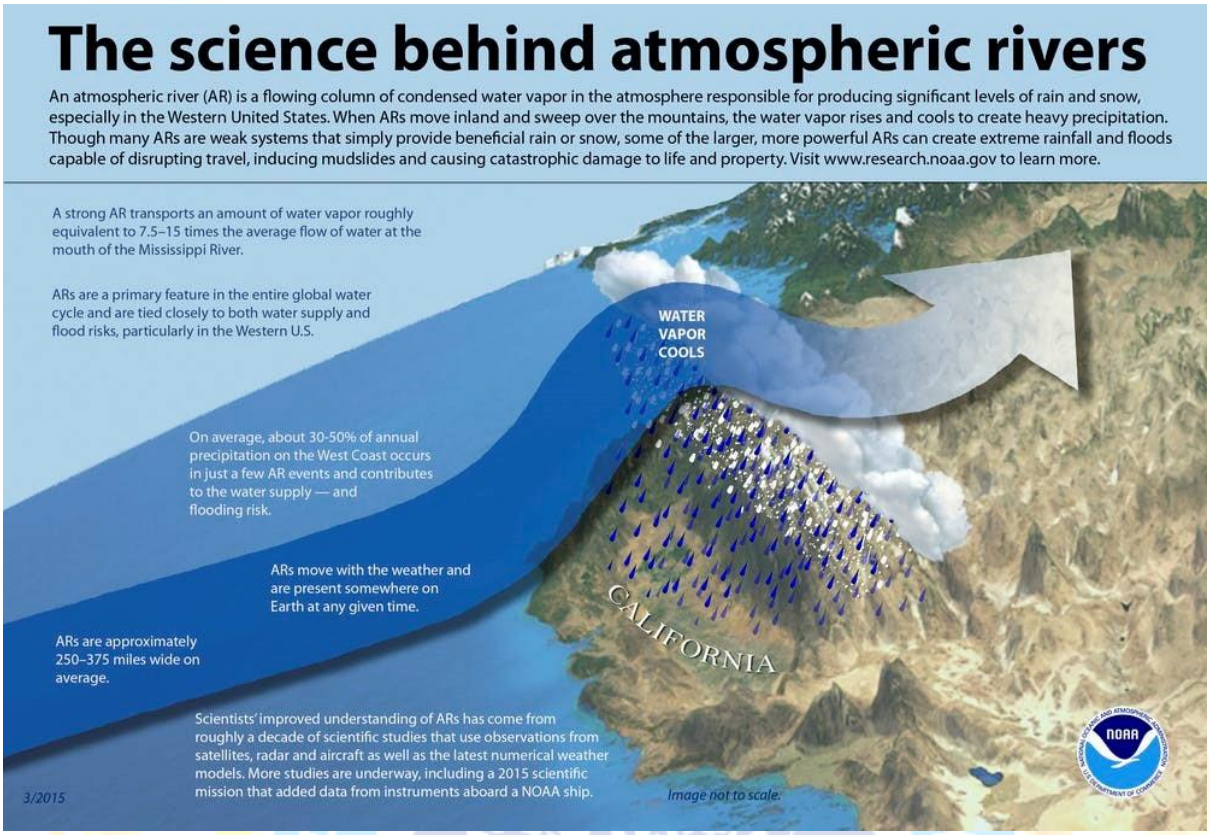
1. **A shape that is long and narrow**, no more than **400 to 500 Km wide,** and extending for thousands of Kilometres sometimes across entire ocean basins.
2. Wind speeds of greater than **12.5 meters per second** in the lowest 2 km.
3. Very thick **Integrated Water Vapour**
4. These **narrow plumes of enhanced moisture transport** occur in the lower troposphere in the low-level jet region (within the warm sector) of extra-tropical cyclones.

Mechanism of precipitation from Atmospheric rivers (Ars)

Heavy rainfall can result, especially when ARs make landfall because of the **convergence and thus vertical uplift within** an AR, and most significantly when the moisture-laden air is forced to rise over mountains. E.g. near the Rockies on the western coast of America

Impact of Atmospheric rivers in the world

ARs are a major cause of extreme precipitation and severe flooding in mid-latitude, westerly coastal regions such as the West Coast of North America, Western Europe, and the west coast of North Africa. Over 80% of flooding damages in Western USA are linked to ARs.More than **80% of all flooding damages in the Western part of the USA** are associated with atmospheric rivers.



Impact of Atmospheric Rivers in India

1. **Eastward-moving cyclonic circulations** in the northern latitudes of India in conjunction with the **atmospheric rivers drawing water vapour from the lower latitudes** under the circumstances of positive interference result in extremely heavy and intense precipitation over the higher reaches of northern India.
2. **Atmospheric Rivers result in heavy precipitation** when they confront mountainous terrain, such as those found in the Himalayan ranges of North India for example:
    1. **2010, Leh in the Ladakh region of Jammu and Kashmir** experienced a cloud burst, and the heavy rains that followed triggered flash floods and mudslides
    2. **2011 Kupwara District in J&K** experienced heavy rainfall. Rain or thundershowers occurred in a large number of places across the country.