Indonesia Tsunami - Causes

Why in news?

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After a major 7.5-magnitude earthquake, tsunami hit Palu, a city in the Indonesian island of Sulawesi, recently.

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What caused the 2004 tsunami?

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- **Vertical earthquakes** - Catastrophic tsunamis are often triggered by ‘megathrust earthquakes’.
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- These occur at subduction zones when one tectonic plate is forced under another.
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- It causes massive chunks of the earth’s crust to move vertically.
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- Such movements on the ocean’s floor cause huge volumes of water to be displaced suddenly.
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- They thus throw up giant waves that can travel very fast across great distances.
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- E.g. the December 2004 Indian Ocean tsunami.
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- It had waves up to 100 ft high which was triggered by a megathrust earthquake of 9.1-magnitude in Sumatra.
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What is the present Indonesia case?

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- **‘Horizontal’ earthquakes** - The recent 7.5-magnitude quake in Indonesia was triggered by what is called a ‘strike-slip fault’.
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- In this type of quake, the earth’s movement is largely horizontal which would not normally trigger a tsunami.
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- However, it is possible for a strike-slip fault to also have some amount of vertical motion that could displace water.
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- Or the fault’s rupture zone may pass through an area where the seafloor rises or drops off.
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- In such cases, when the fault moves during the quake, it pushes seawater in front of it.
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- Notably, in Indonesia's case, the fault’s rupture zone was estimated to be about 70 miles long, suggesting a large possibility for the above.
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- **Landslide** - Another possibility is that there could have been a mudslide on the ocean floor.
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- This could have displaced a lot of water and created waves, causing a cataclysmic effect on the bay.
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- **Topography** - The tsunami could have been impacted by Palu’s location at the end of a narrow bay.
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- The coastline and the shape of the bottom of the bay could have focused the wave energy and guided it up the bay.
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- This could have increased the wave height as it approached the shore.
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Source: Indian Express

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