सत्यमेव जयते

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

Questions 1

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World Meteorological Organization
Organisation météorologique mondiale

FLASH FLOOD

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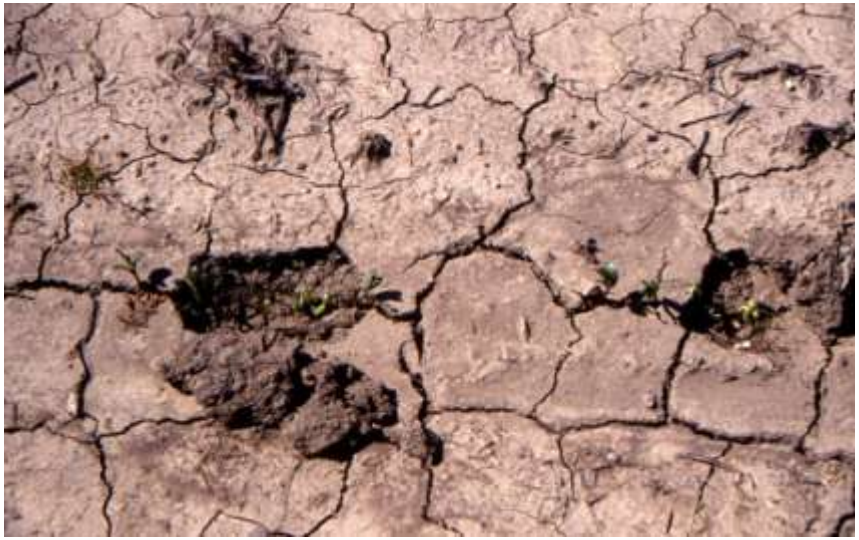
FLASH FLOOD

- Flash floods are hydrometeorological events that are result of heavy or excessive rainfall amounts within a short period of time, usually less than 6 hours, causing stream waters to rise and fall quite rapidly.

- Flash floods are hydrometeorological phenomena requiring an integration of meteorology and hydrology in real time with an infusion of local information and expertise to deliver reliable flash flood warnings.

Flash Floods can occur when the soil is very dry.

When soil is dry, soil crusts can be formed.
These can significantly reduce soil infiltration rate and subsequently the utilization of water resources, and increase surface runoff, especially during intense convective rainfall.



True ☑ False ☐

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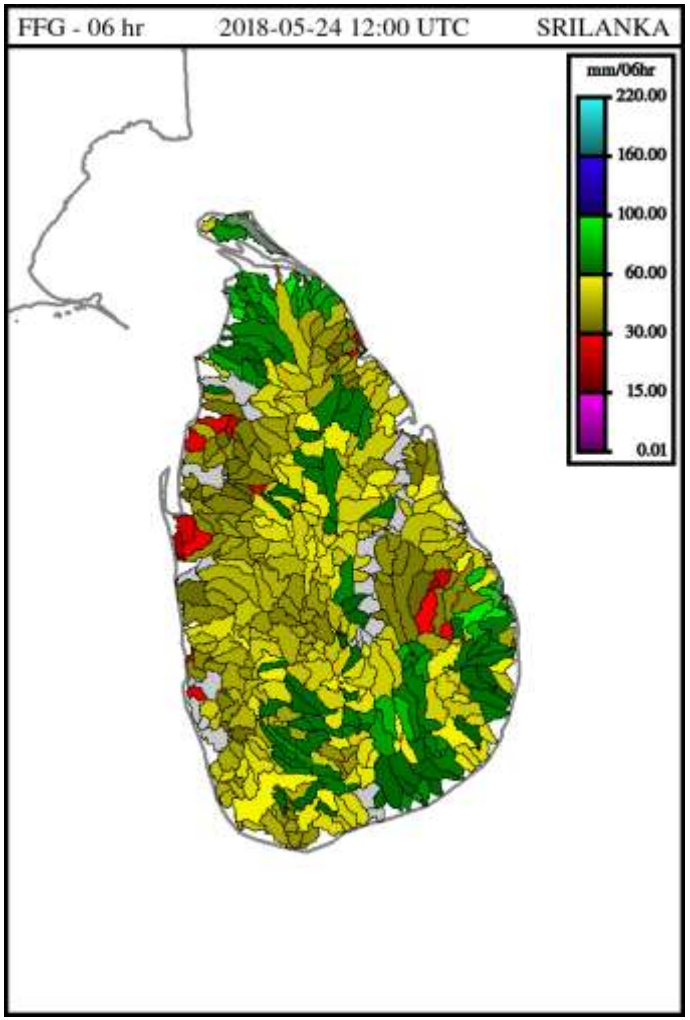
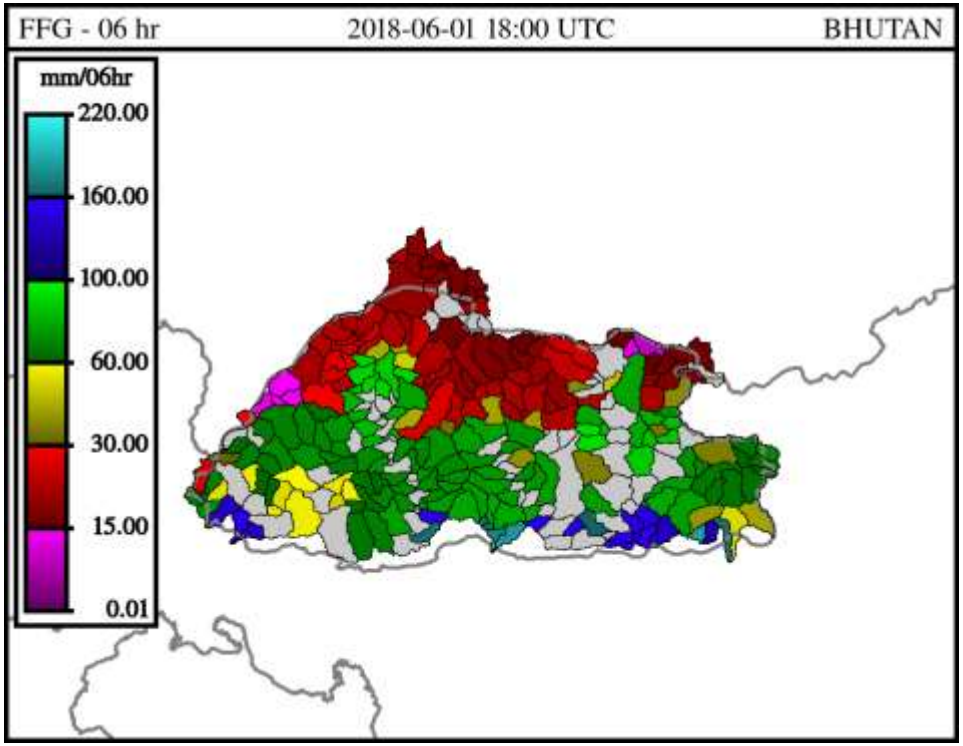
FLASH FLOOD GUIDANCE





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FLASH FLOOD GUIDANCE

- The FFG is defined as the amount of actual rainfall (the total volume of rainfall) of a given duration (e.g. 1, 3 or 6 hours) that is just enough to cause bankfull flow at the outlet of the catchment.

- Flash Flood Guidance then is an index that indicates how much rainfall is needed to overcome soil and channel storage capacities and to cause minimal flooding at the outlet of a given small basin.

- The FFG is calculated and updated at every six hours at the model processing hour of 00, 06, 12 and 18 UTC and is valid for the next 1, 3 and 6 hours.

DEFORESTATION

Deforestation does not generally result in:

a) More surface runoff
b) More flood risk
c) More sediment transport
d) More infiltration

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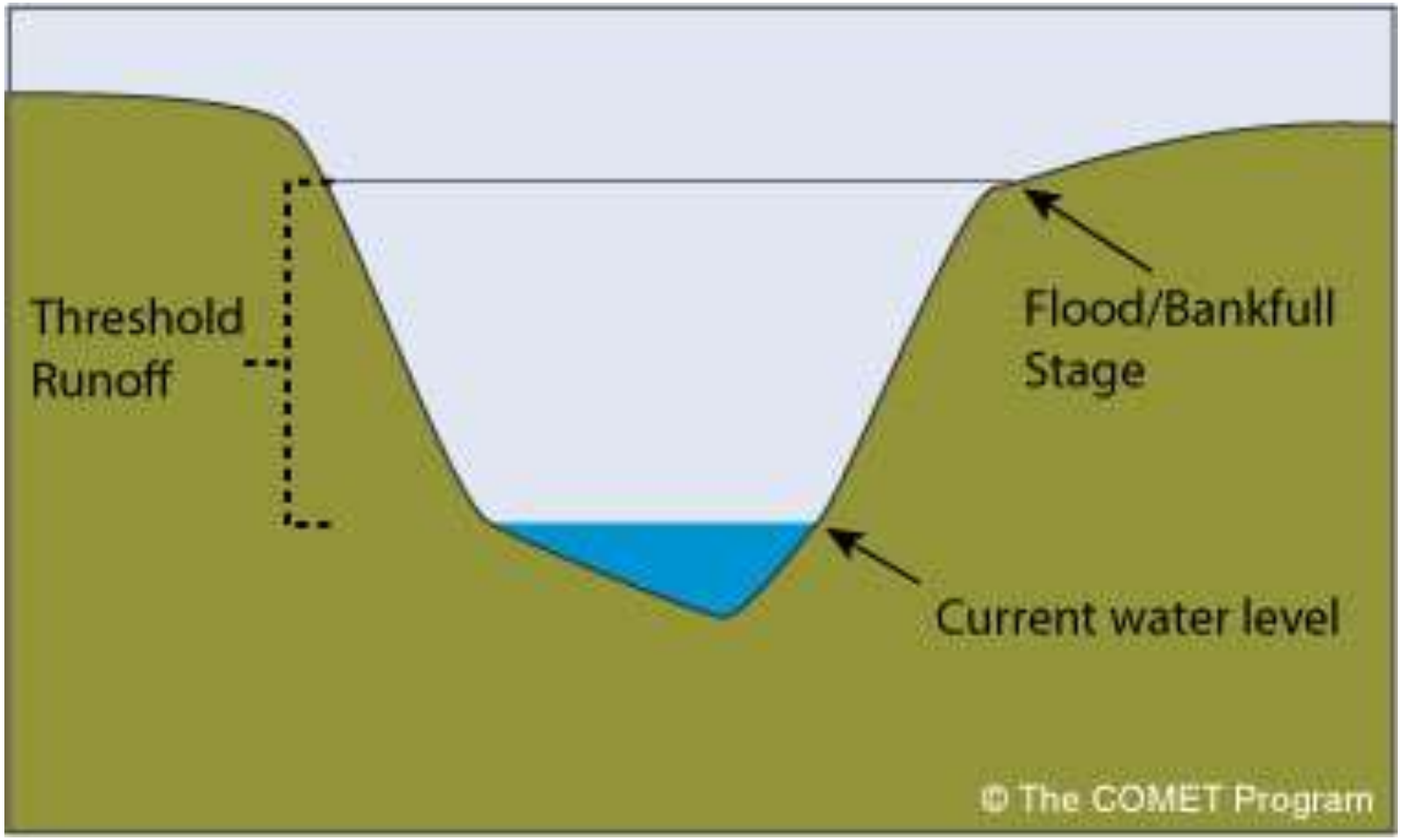
THRESHOLD RUNOFF



THRESHOLD RUNOFF

- The threshold runoff is amount **effective rainfall** of a given duration falling over the watershed that is just enough to cause **bankfull conditions** at the outlet of the catchment.

- It is one time calculation for a given watershed and it is computed:
  - through geomorphological theory
  - with use of global DEM
  - soils, land cover-land use
  - along with regional stream data

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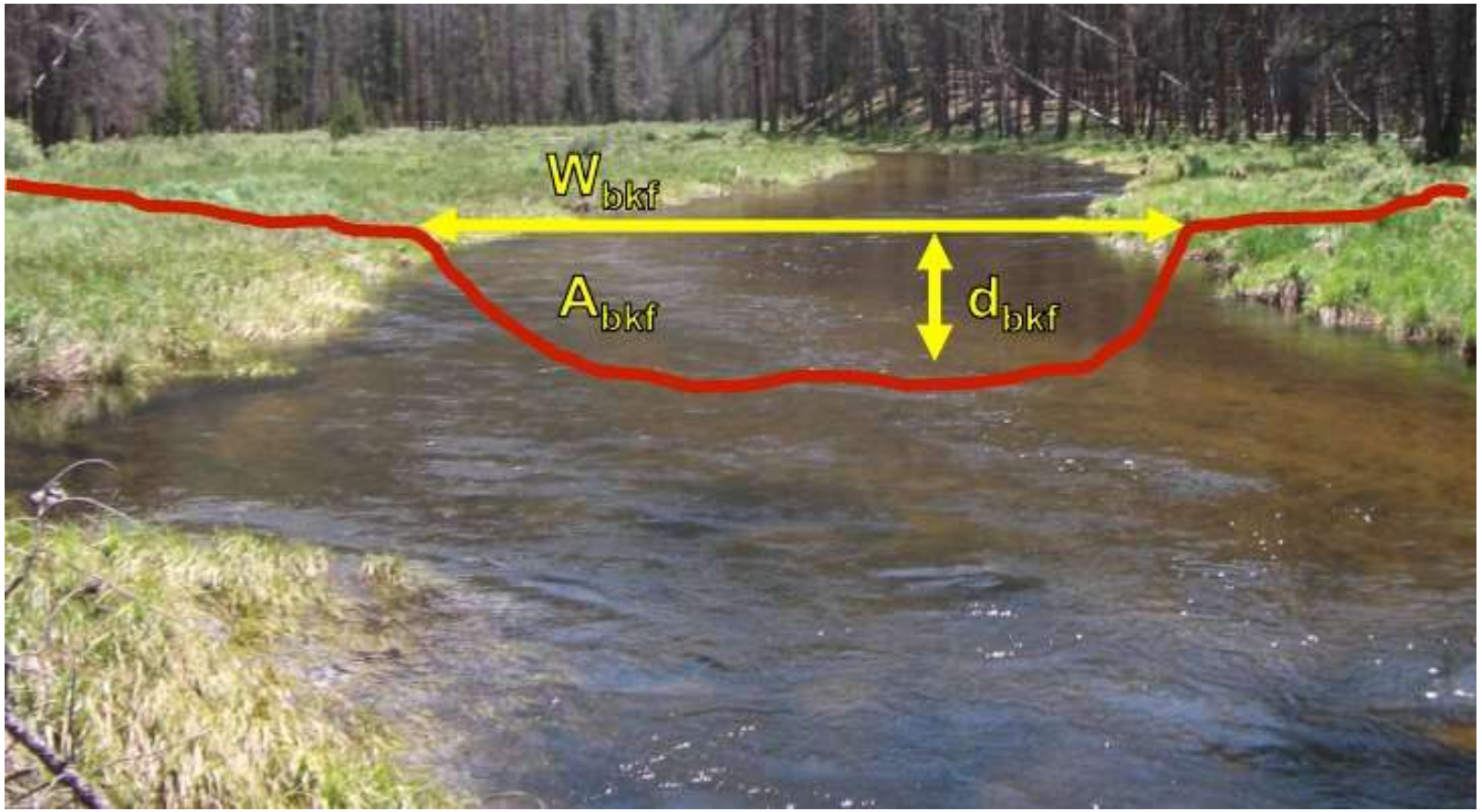
BANKFULL CONDITION



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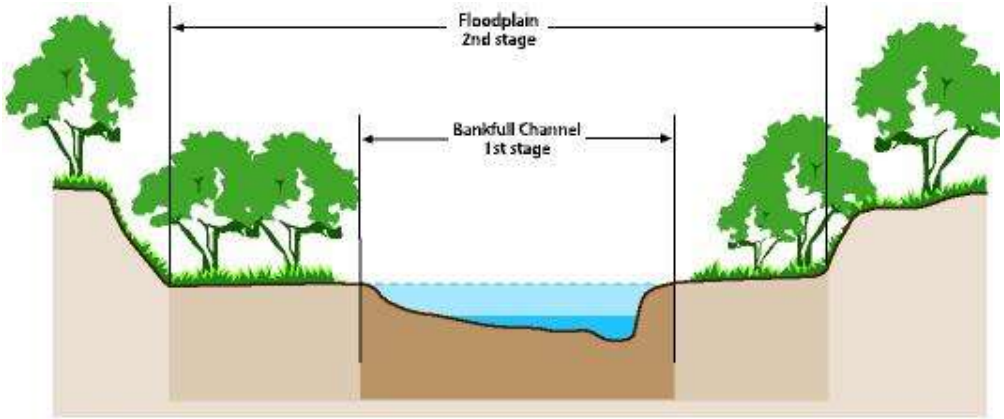
BANKFULL CONDITION

- Bankfull stage is depth of water in the channel at which flooding begins.
- Bankfull flow is a conservative measure of flooding and is not generally associated with flood damage.
- It may be associated with flow of given return period (typically 2-5 years).



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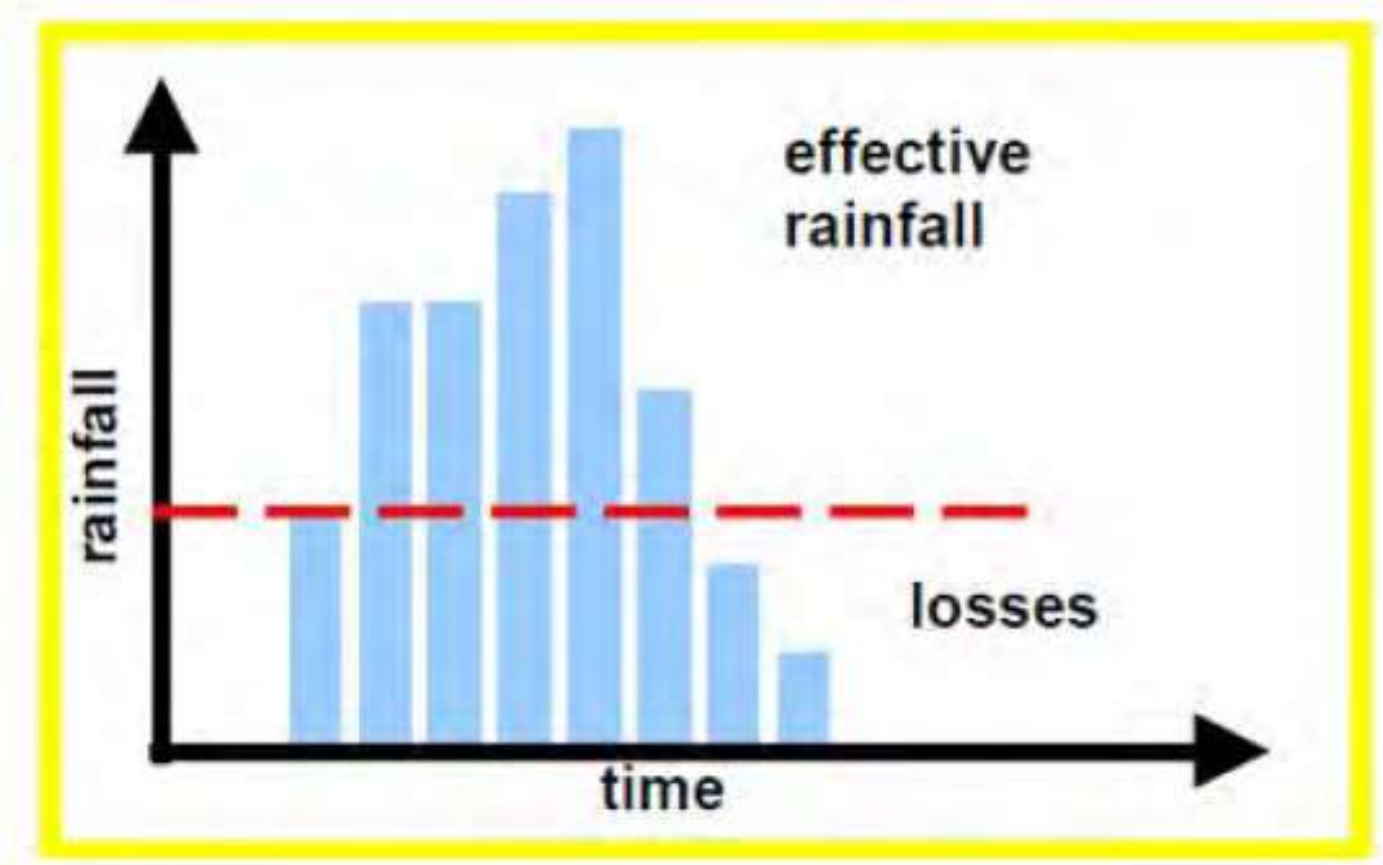
EFFECTIVE RAINFALL

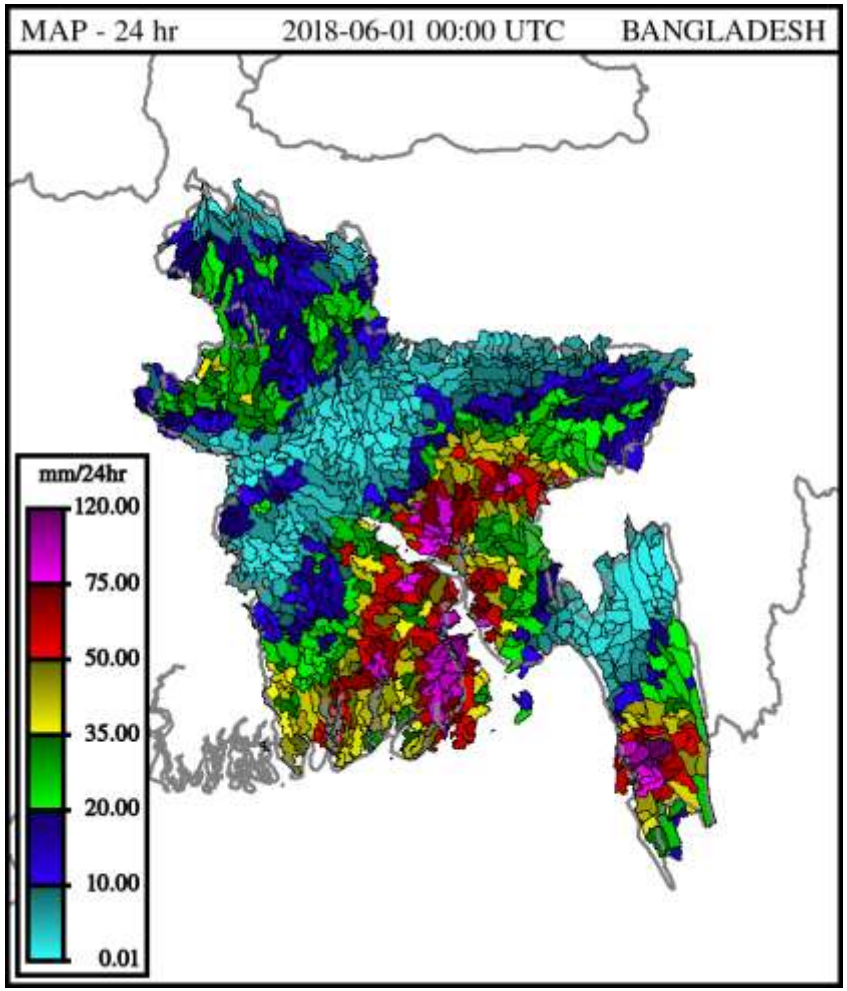


EFFECTIVE RAINFALL

- Effective rainfall is the residual amount after accounting for all losses such as interception and soil moisture storage.

Merged MAP

Definition and which products are included in the Merged MAP product?



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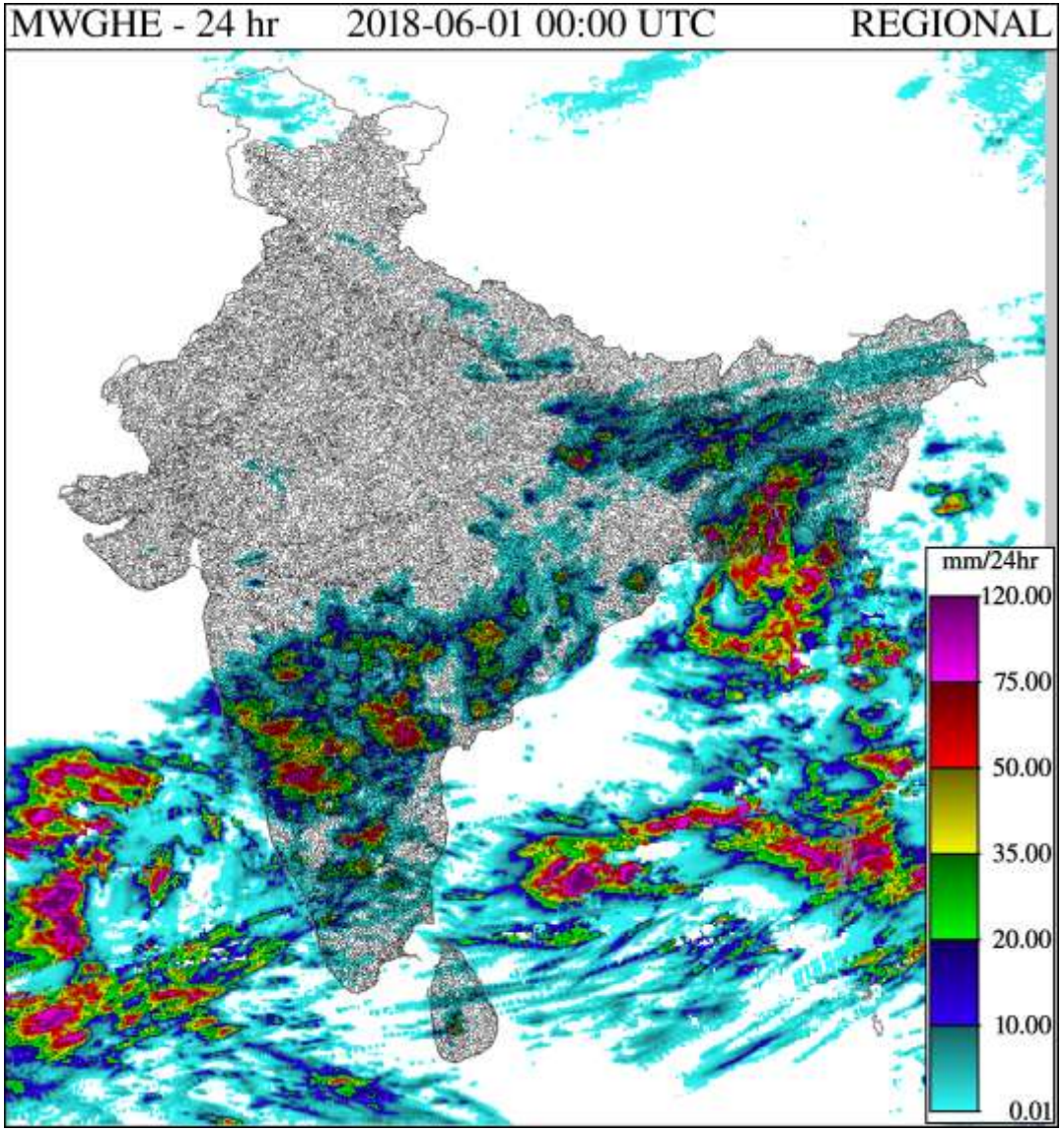
Merged MAP

- Merged MAP provides **bias-corrected, best estimates** of 1-, 3-, 6- and 24-hour precipitation accumulations over each of FFG system basins.

- This product is derived by selecting the best-available 1-hour precipitation input product for each basin from the bias-adjusted MWGHE or bias-adjusted GHE or the gauge-interpolations.

MWGHE


MWGHE - 24 hr
2018-06-01 00:00 UTC
REGIONAL
mm/24hr
120.00
75.00
50.00
35.00
20.00
10.00
0.01

MWGHE

- The Microwave-adjusted Global Hydro Estimator (MWGHE) Satellite-based precipitation product provides Global Hydro Estimator (GHE) satellite-based accumulated precipitation estimate (IR-based) adjusted by available MW-based satellite precipitation estimates to improve GHE accuracy.

- The satellite-based rainfall estimates are provided on a grid which is displayed over a background of the system sub-basin boundaries. The MWGHE data products are updated every hour with a latency of approximately 45 minutes and no adjustment for bias is precipitation bias is made for the gridded products.

Infiltration excess overland flow is more likely during intense rainfall with:

a) Clay
b) Silt
c) Sand
d) Loam

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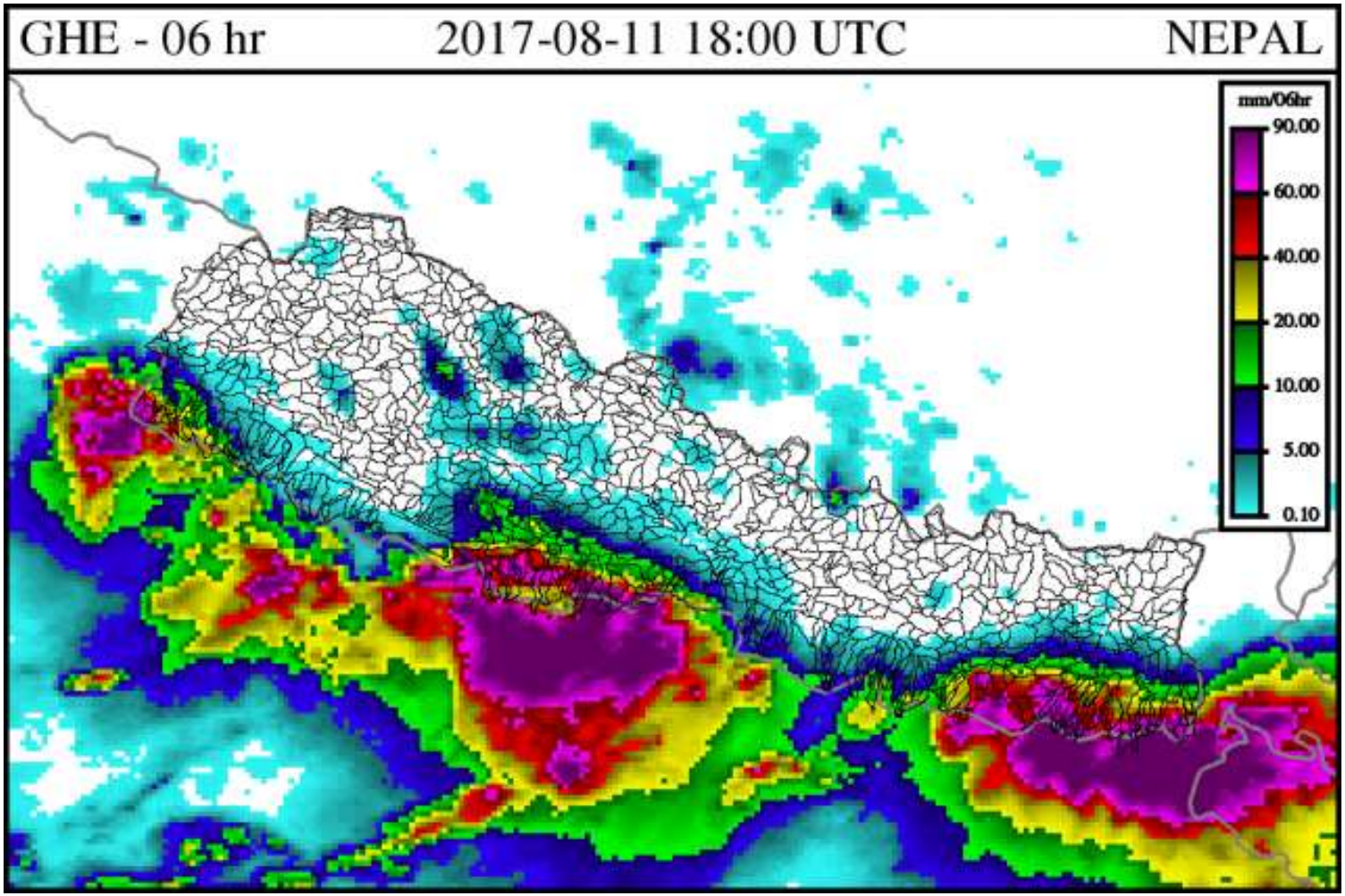
GHE


GHE - 06 hr
2017-08-11 18:00 UTC
NEPAL
mm/06hr
90.00
60.00
40.00
20.00
10.00
5.00
0.10

GHE

- GHE: (infrared based) satellite-based NOAA NESDIS product provides accumulations of precipitation (mm)
- The images and text provide grided 1, 3, 6, 24-hr accumulations of satellite-based rainfall estimates ending on the current hour from NOAA NESDIS Hydroestimator
- The data products are updated every hour with latency of approximately 25 minutes and are not bias corrected.
- The GHE prec. Algorithm estimates precipitation by using cloud top T called Brightness temperature from the IR window.

FLASH FLOOD

A flash flood is a flood that occurs within _____ of a causative event.

Choose the best answer.

a) 6 hours
b) 3 days
c) 24 hours
d) 12 hours

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FLASH FLOOD

The cause of a flash flood can be _____.

Choose the best answer.

a) intense rainfall
b) dam failure
c) river ice jam
d) all of the above

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Which of the following reduce the risk of flash flooding and why?

Choose all that apply.

a) Large basin size
b) Short-duration rainfall
c) Steep slope
d) Restoration of natural vegetation

Urbanization increases flash flood risk because it _____.

Choose all that apply.

a) makes stream channel surfaces rougher
b) increases the runoff speed
c) increases the amount of water that becomes runoff
d) causes more meandering of streams

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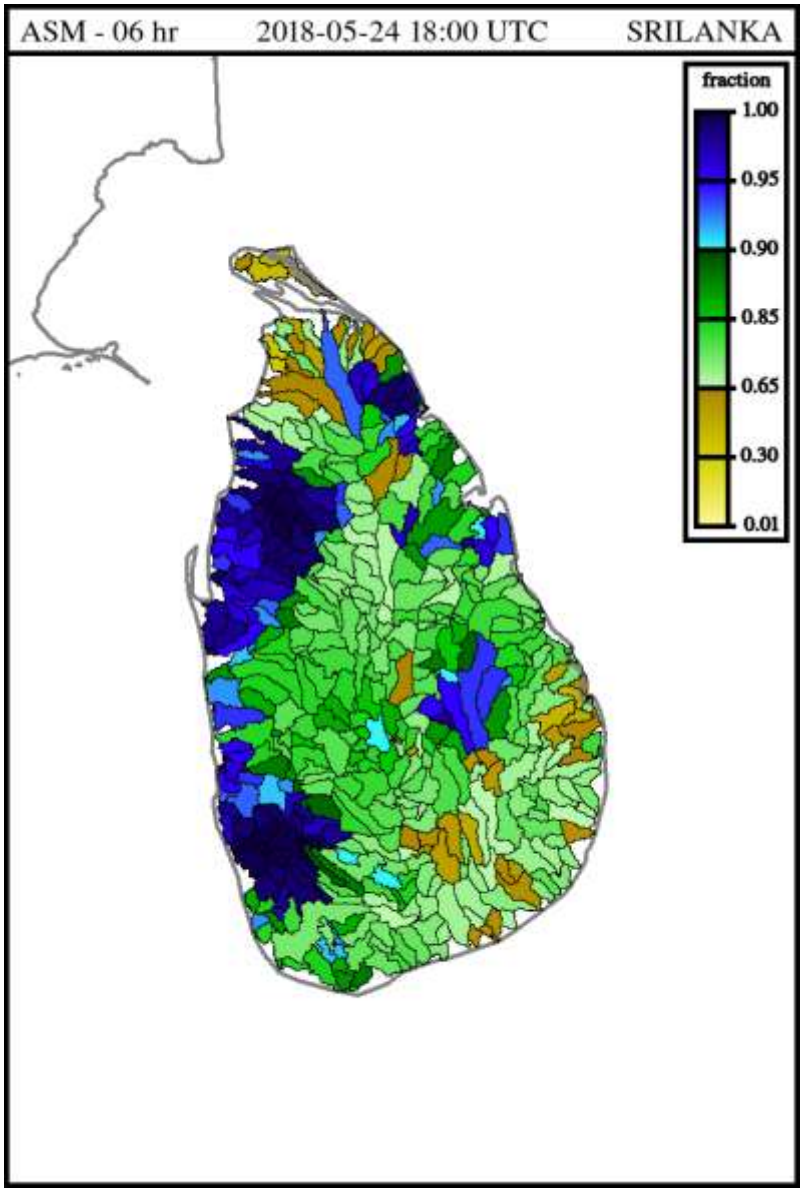
AVERAGE SOIL MOISTURE



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AVERAGE SOIL MOISTURE

The Average Soil Moisture (ASM) product shows **soil water saturation fraction** (dimensionless ratio of contents over capacity) for the upper zone tension and free water contents (20-30 cm depth) of the SAC-SMA for each of the sub-basins.

The ASM products are updated **every 6 hours** at the model-processing hour at 00, 06, 12 and 18 UTC.

RUNOFF

In addition to the greater coverage of impervious surfaces that increases runoff in urban areas, other important considerations for urban and suburban basins include that _____.

Choose all that apply.

a) the runoff occurs much more quickly due to storm sewer networks and the road grid

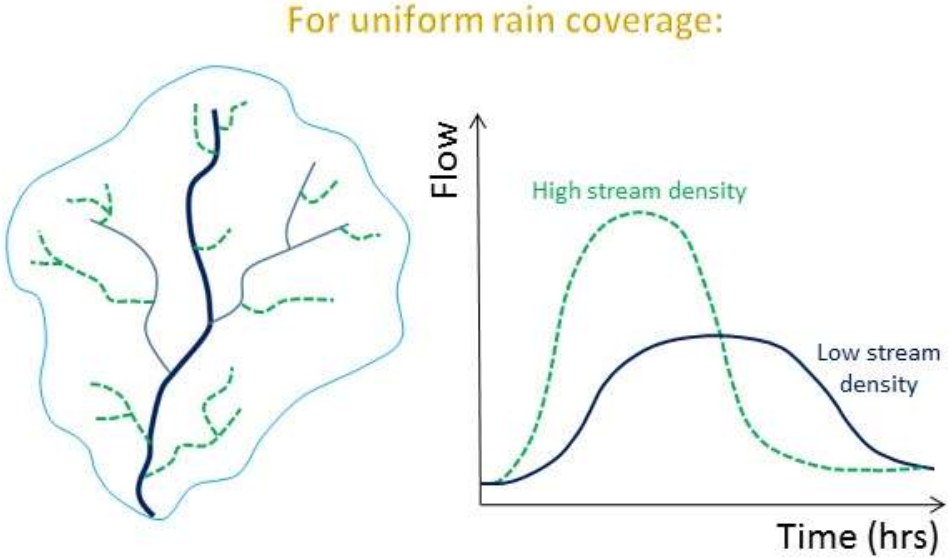
b) the speed of runoff is decreased in channelized streams

c) different degrees of development can make some urban basins more problematic than others

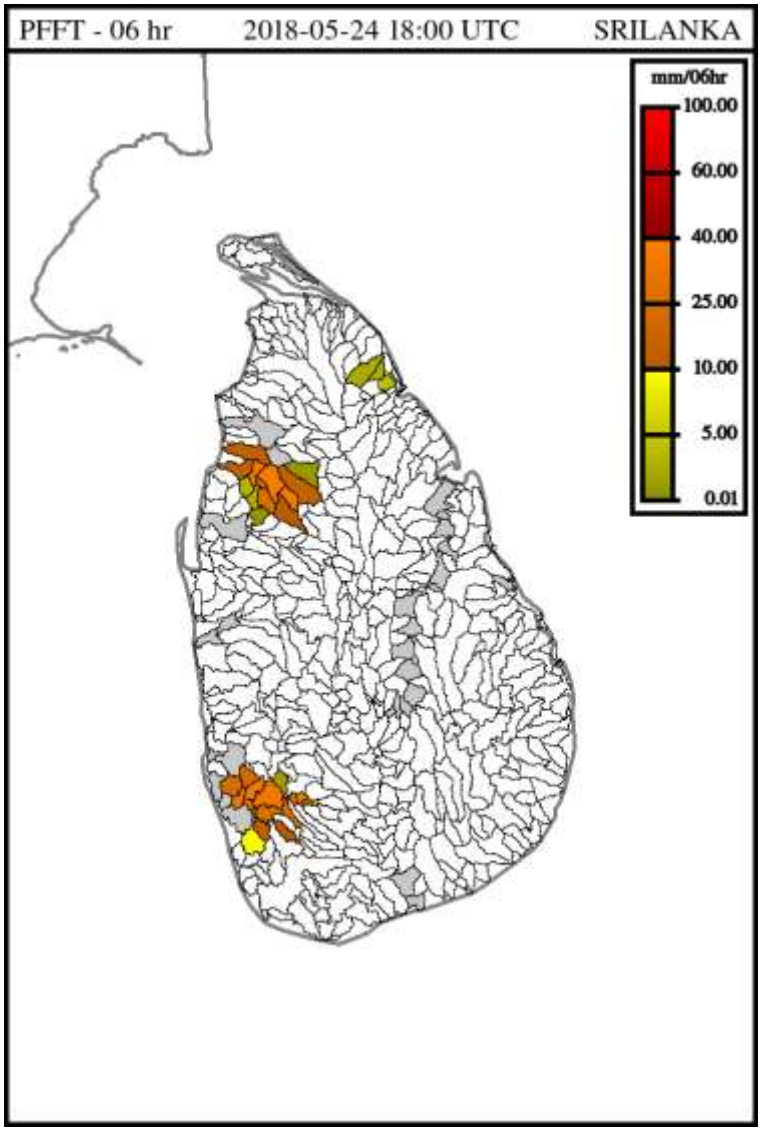
Runoff timing and magnitude are influenced by basin _____.

Choose the best answer.

a) size and shape
b) drainage density and slope
c) channel roughness and degree of channel meandering
d) all of the above



FLASH FLOOD THREATS



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FLASH FLOOD THREATS

- FFTs are amounts of rainfall of a given duration in excess of the corresponding Flash Flood Guidance value (existing/past or forecast) rainfall.

- Like FFG, FFT products are computed for 1-, 3-, and 6-hour durations and updated every 6 hours.

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Thank you

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For more information please visit:	**http://www.wmo.int/ffgs**
	http://www.hrcwater.org