

Updated “climate factors” for use in planning and design of infrastructure in Norway

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Norwegian Centre for Climate Service (NCCS)

provides the scientific basis for climate adaptation in Norway

cooperation between



Our motto:

**Be prepared for
future weather**

Foto: Magne Velle,
MET Norway



Photo: Oddleif Løset, NRK



Photo: Helge Mikaelson, VG

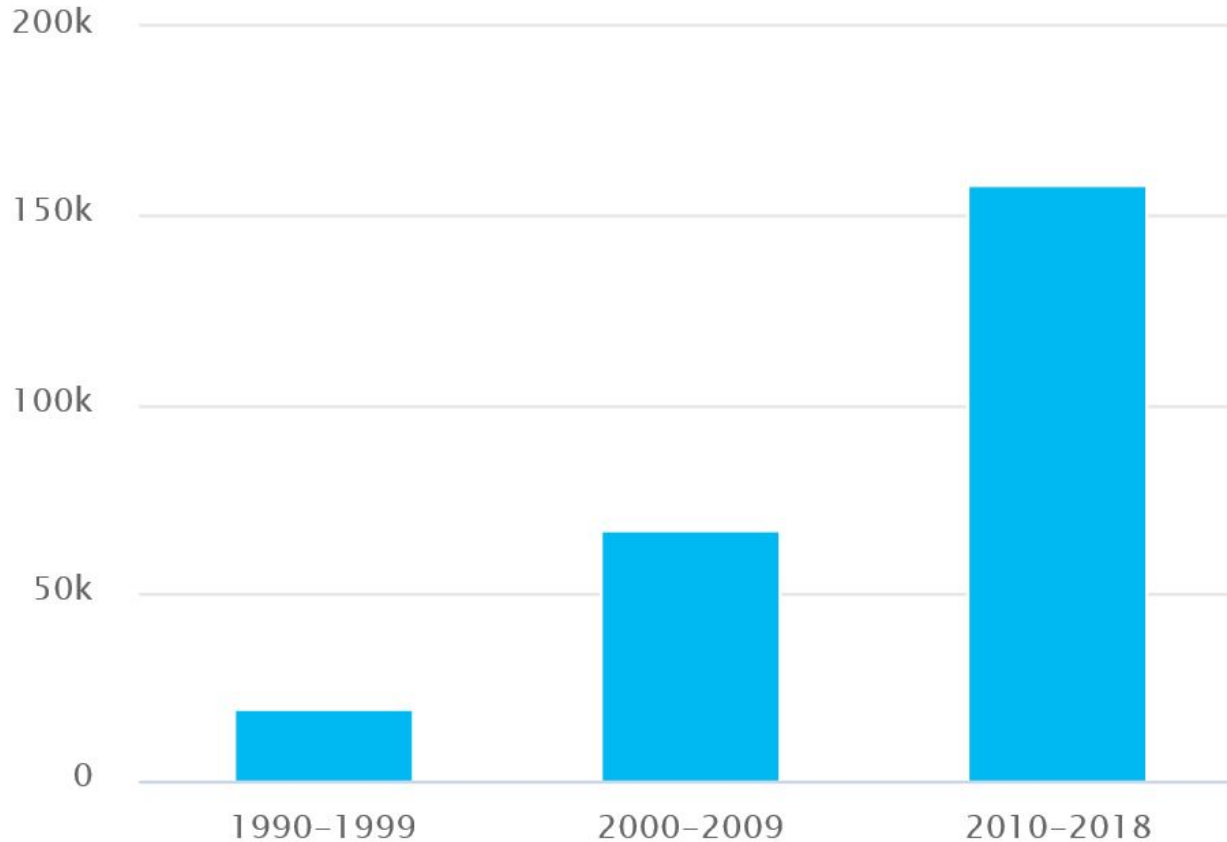


Photo: Oddleif Løset, NRK



Photo: VG

Number of reported damages

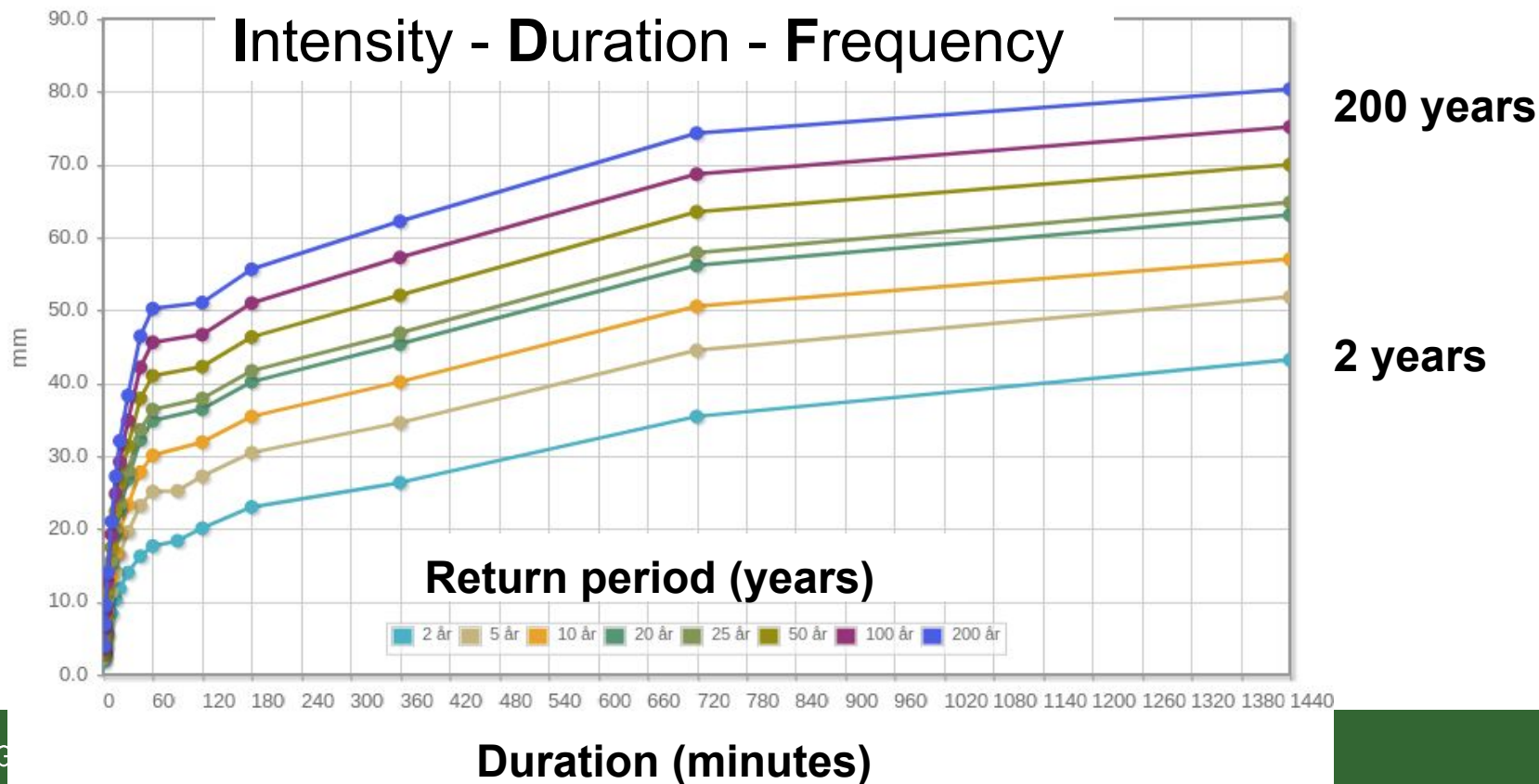


Source:
CICERO/IF



The most intense rainfall will increase the most

Design values for precipitation



Climate factor

Change in precipitation design values between historical and future climate period [factor]

5-year return level, 12 hour duration

1971-2000: 44 mm

2071-2100: 58 mm

Climate factor = $58/44 = 1.38$ mm

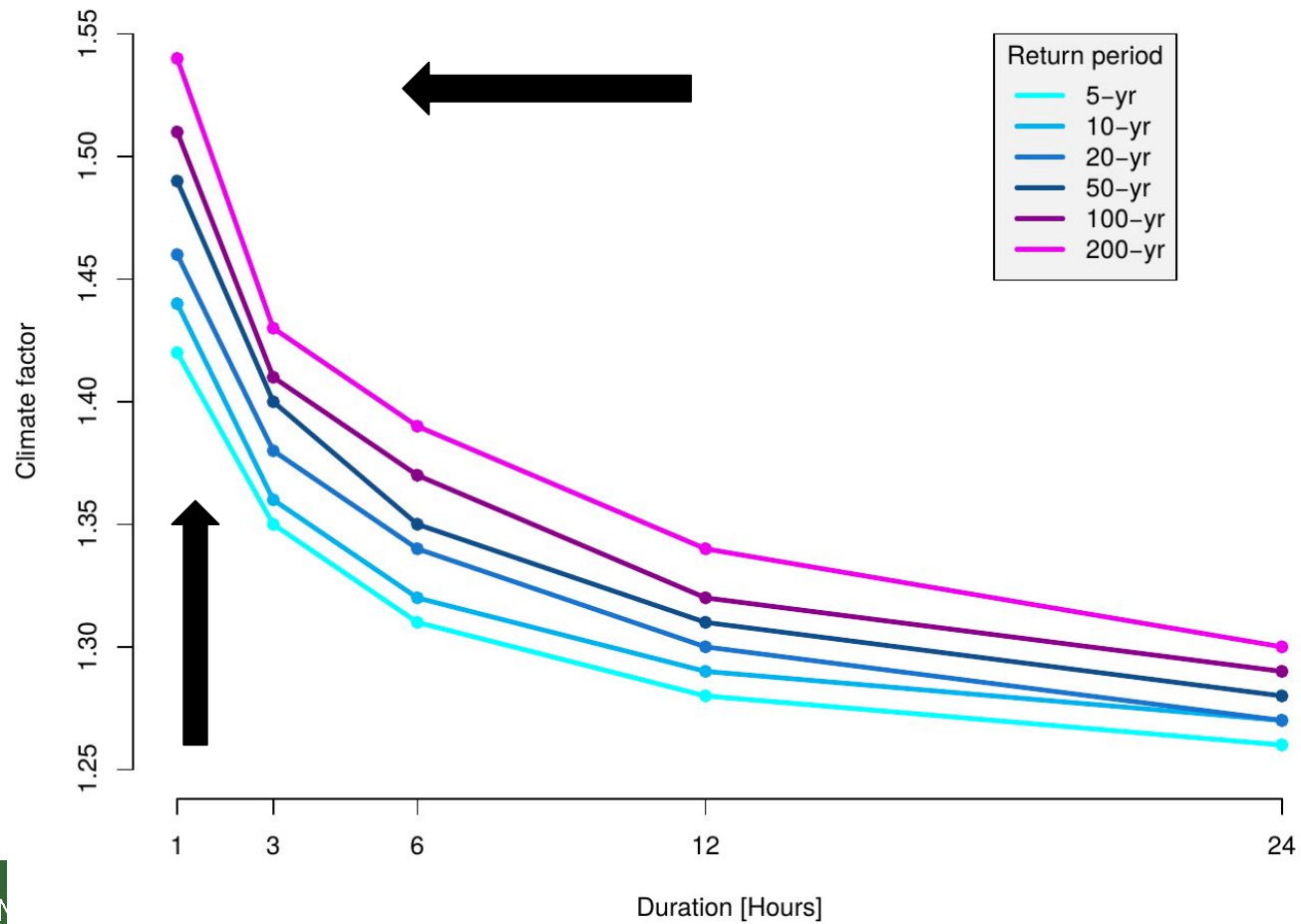
Climate factor

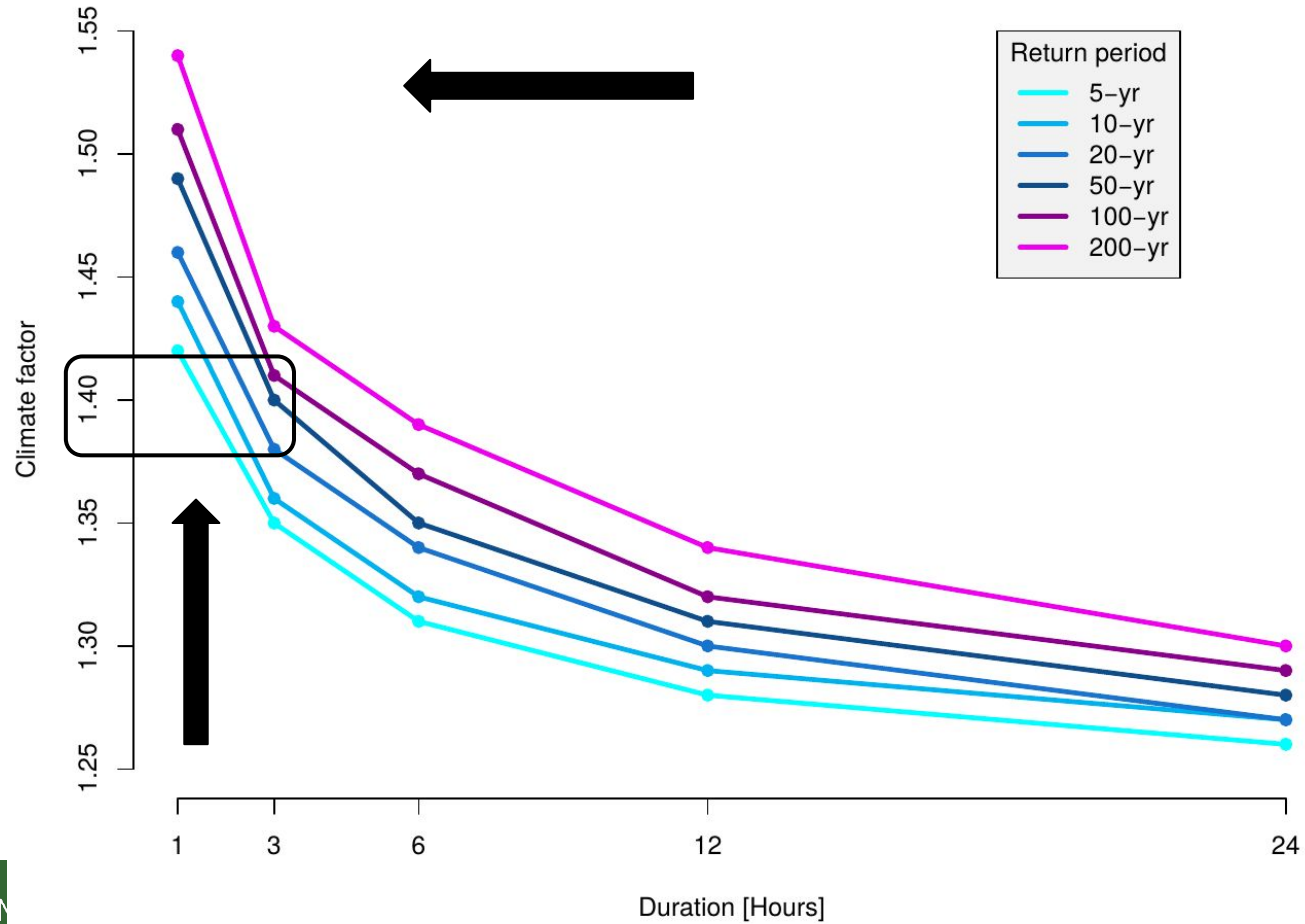
Data:

- 12 Euro-CORDEX simulations
- 0.11° resolution (~12 km)
- RCP8.5 (“Business as usual”)
- Durations: 1, 3, 6, 12, 24 hrs
- Current climate: 1971-2000
- Future climate: 2071-2100

Method:

- Change in 5-200 year return levels
- GEV stationary methods
 - Max. Likelihood Estimation
 - Bayesian estimation
- GEV non-stationary method
 - Bayesian estimation





Climate buffer

Recommended scaling of current design values for the proper design of infrastructure in a future climate [%]

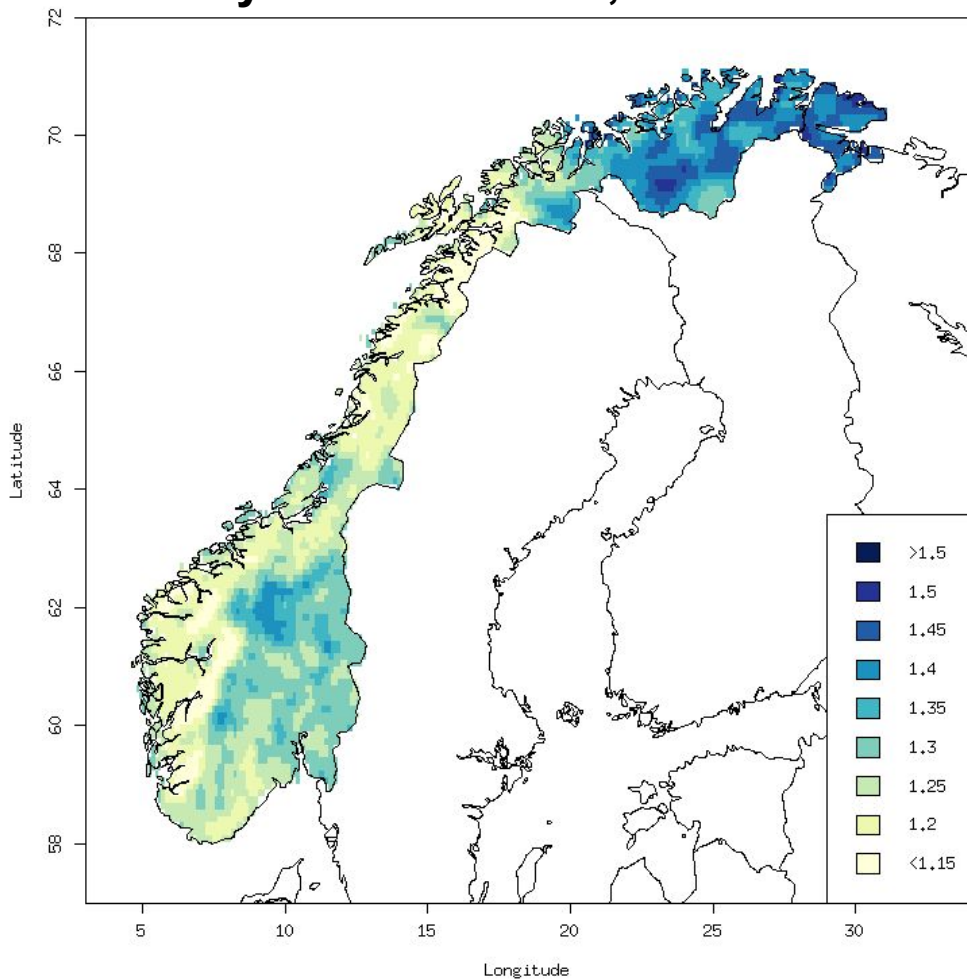


Climate factor → Climate buffer

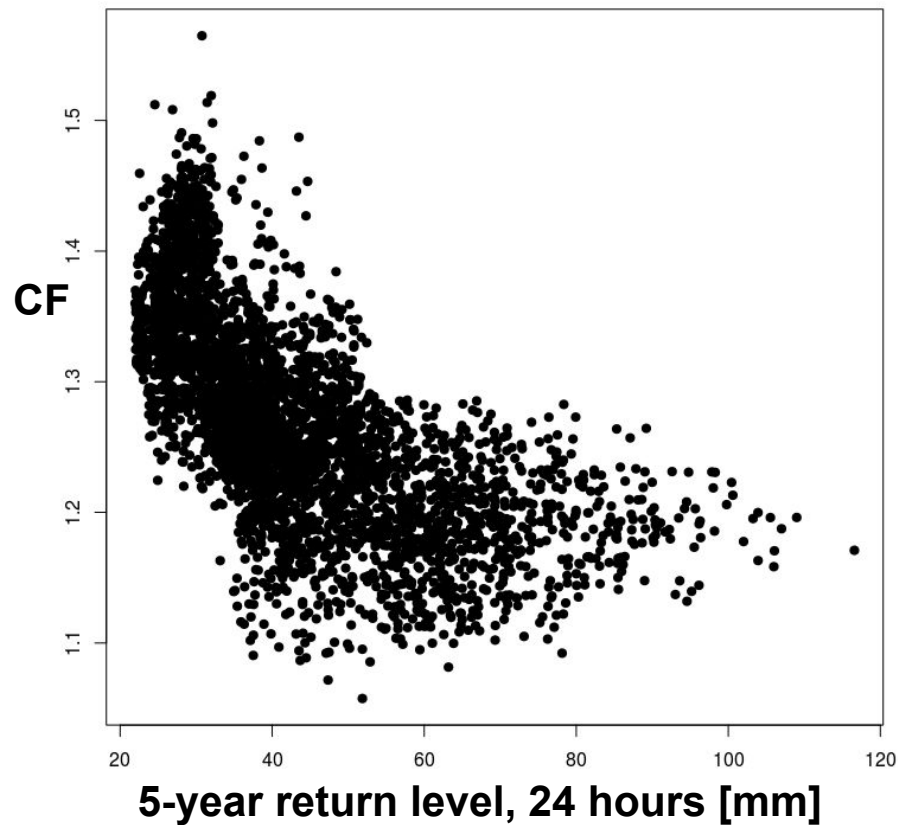
- Uncertainties in the climate projections
- Spatial distribution of climate factors
- User needs

 **Robust and simple recommendations**

5-year return level, 24-hours



5-year return level vs. climate factor



Less critical infrastructure

Critical infrastructure

Duration

Dry

Wet

Dry

Wet

≤ 1 hour	40 %	40 %	50 %	50 %
2 – 3 hours	40 %	30 %	40 %	30 %
4 – 6 hours	30 %	30 %	40 %	30 %
7 – 24 hours	30 %	20 %	30 %	30 %

Examples:

20 year return period

+ 1 hour duration:

40%

100 year return period

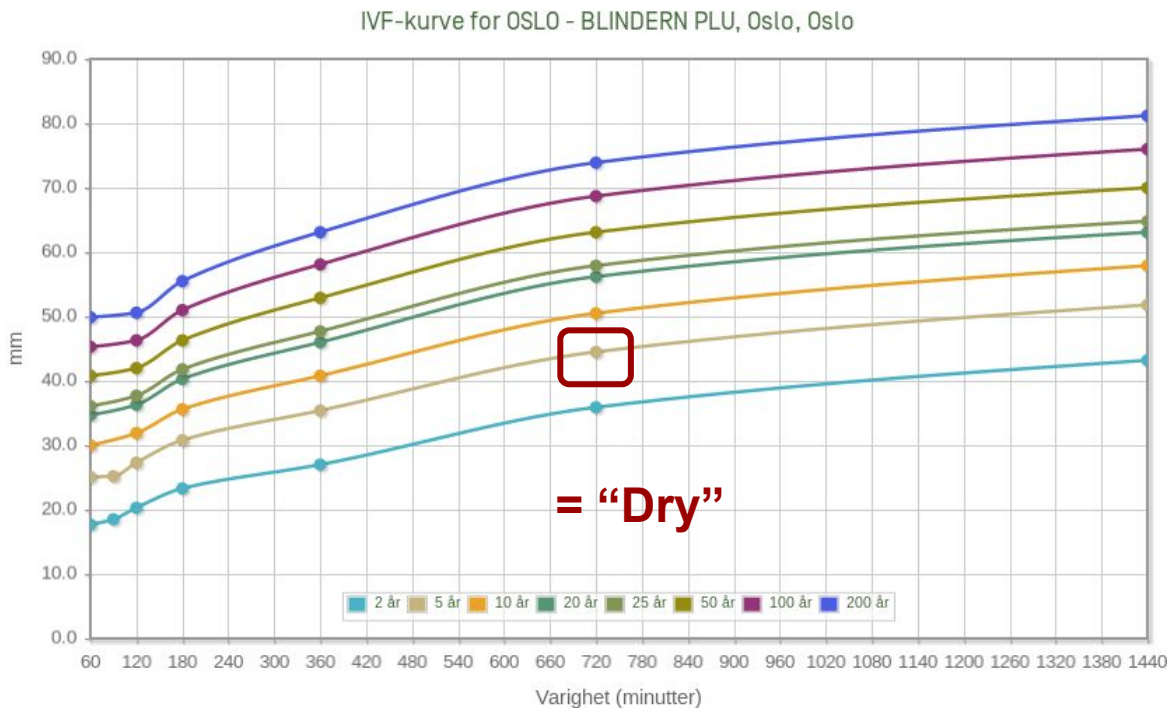
+ 1 hour duration:

50%

20 year return period

+ 12 hour duration:

30%



Change in 200-year flood

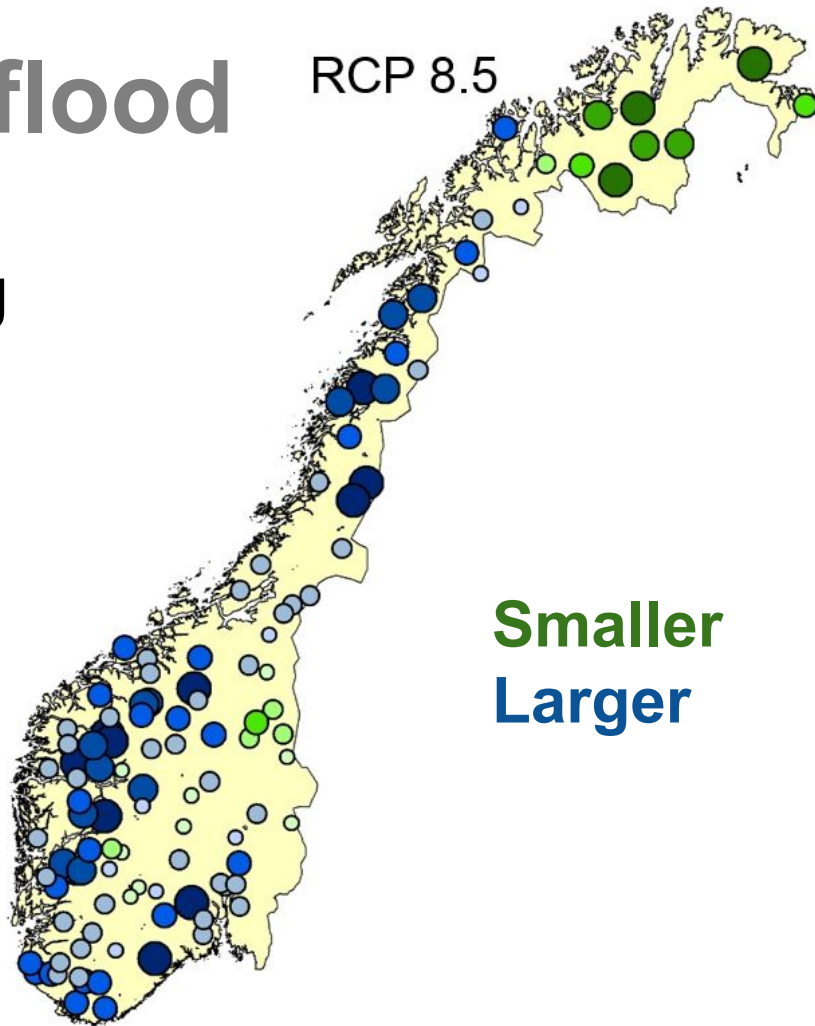
→ **Climate buffer for flooding**

0 %

20%

40%

RCP 8.5



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