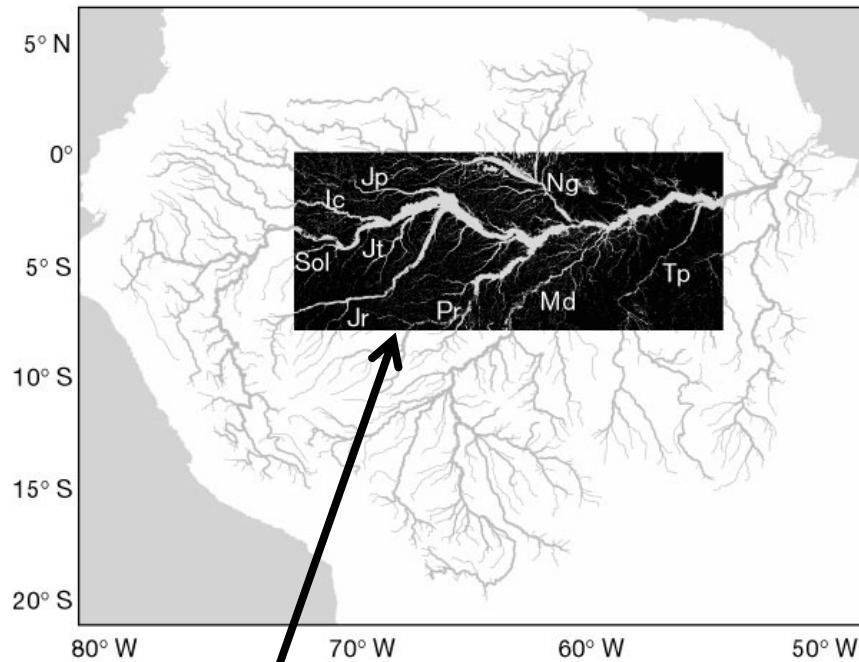


Floodplain inundation in ORCHILEAK

Ronny Lauerwald

Seasonal flooding

Flooding of the Central Amazon Basin (averages 1995-1997)

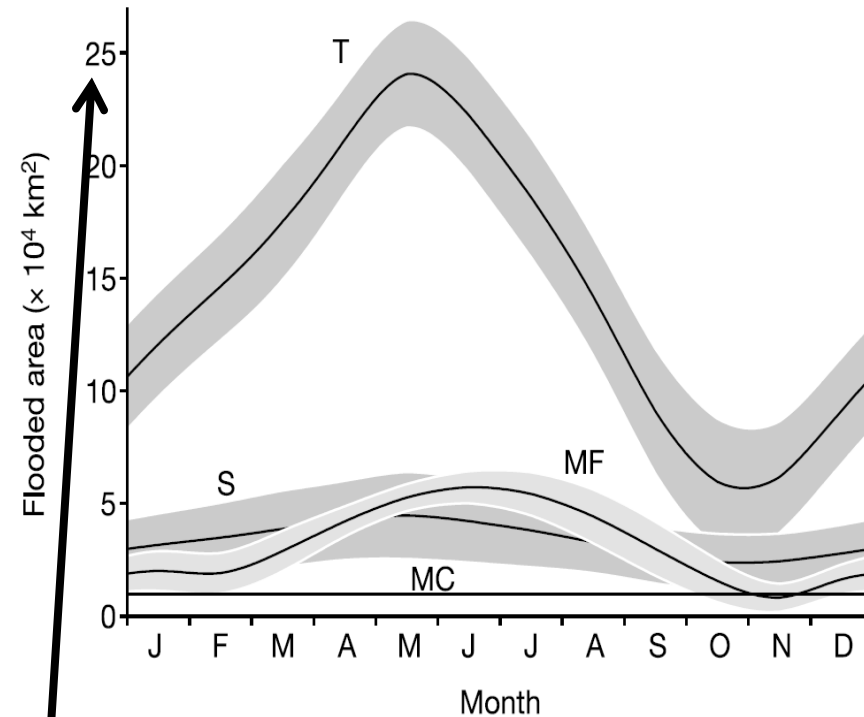


Central Amazon Basin

Area = $177 \times 10^4 \text{ km}^2$

~ 30% of watershed

Observation



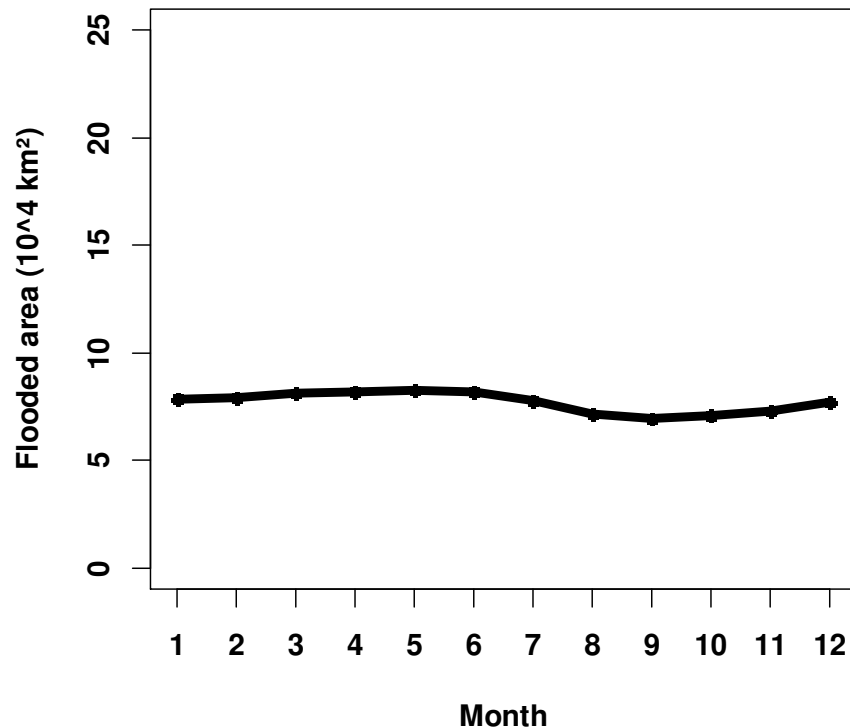
Richey et al., 2002

$25 \times 10^4 \text{ km}^2 = 14 \% \text{ of the Central Amazon Basin}$

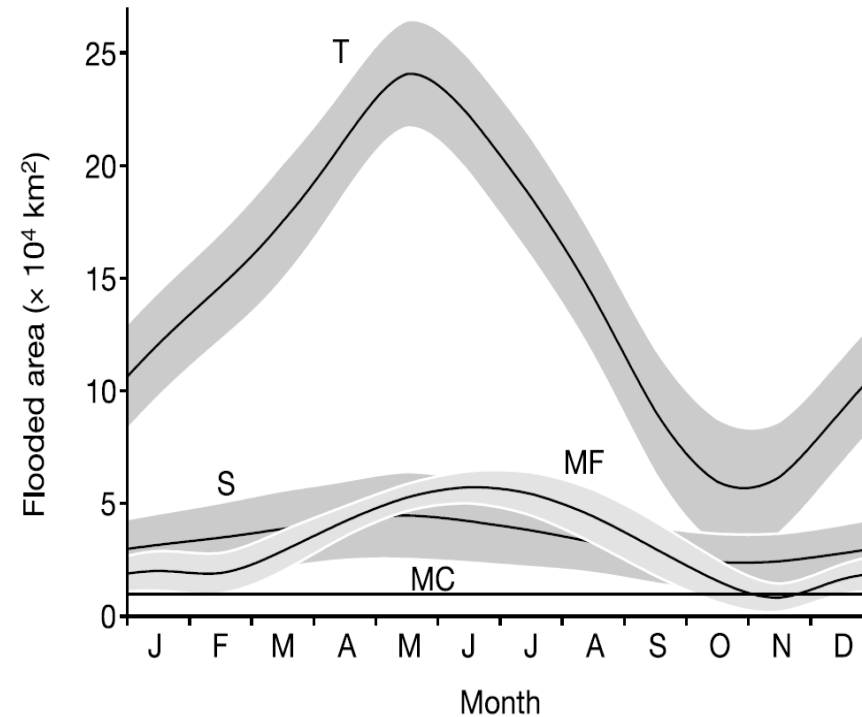
Seasonal flooding – ORCHIDEE TRUNK

Flooding of the Central Amazon Basin (averages 1995-1997)

Simulation



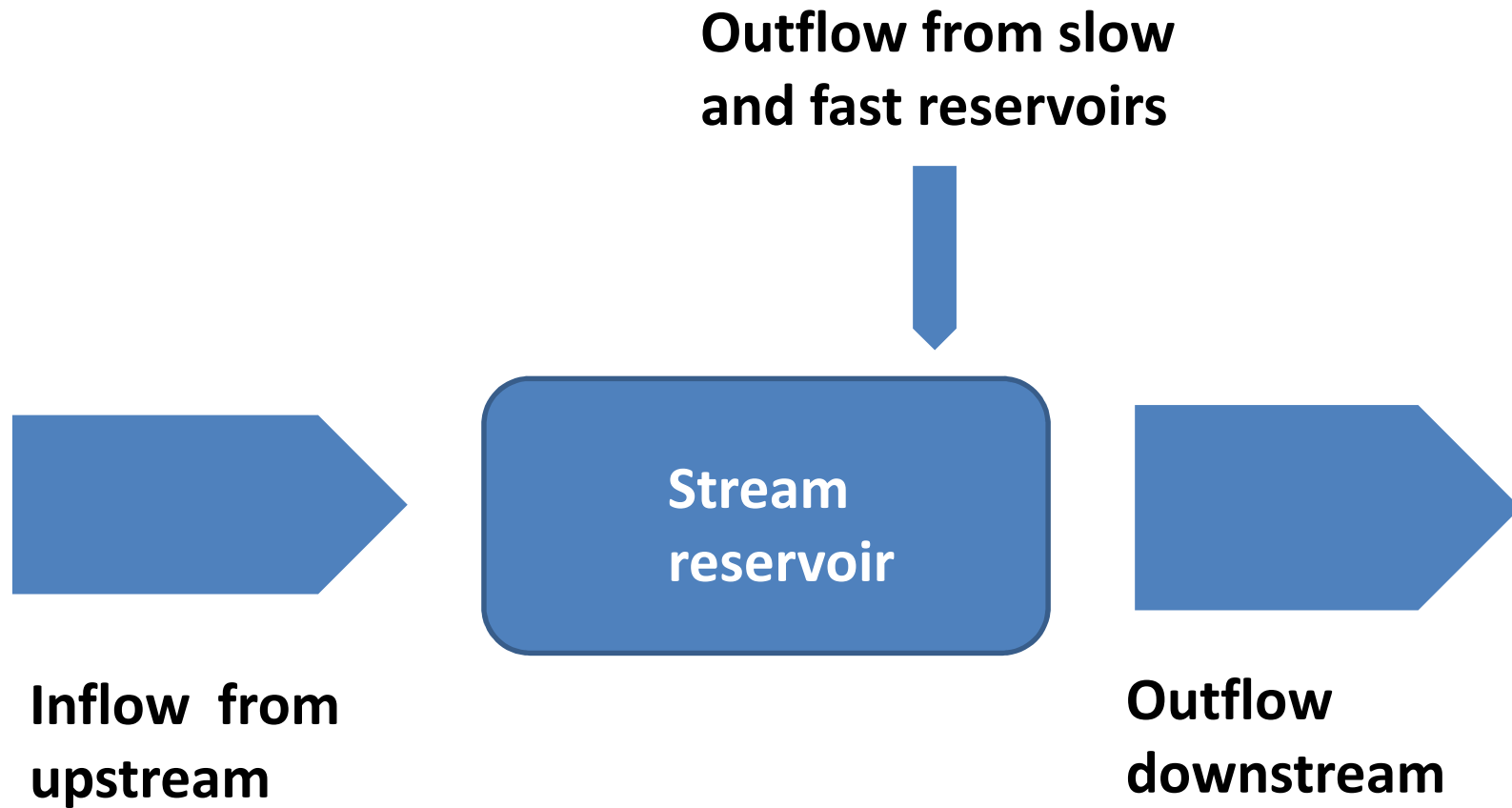
Observation



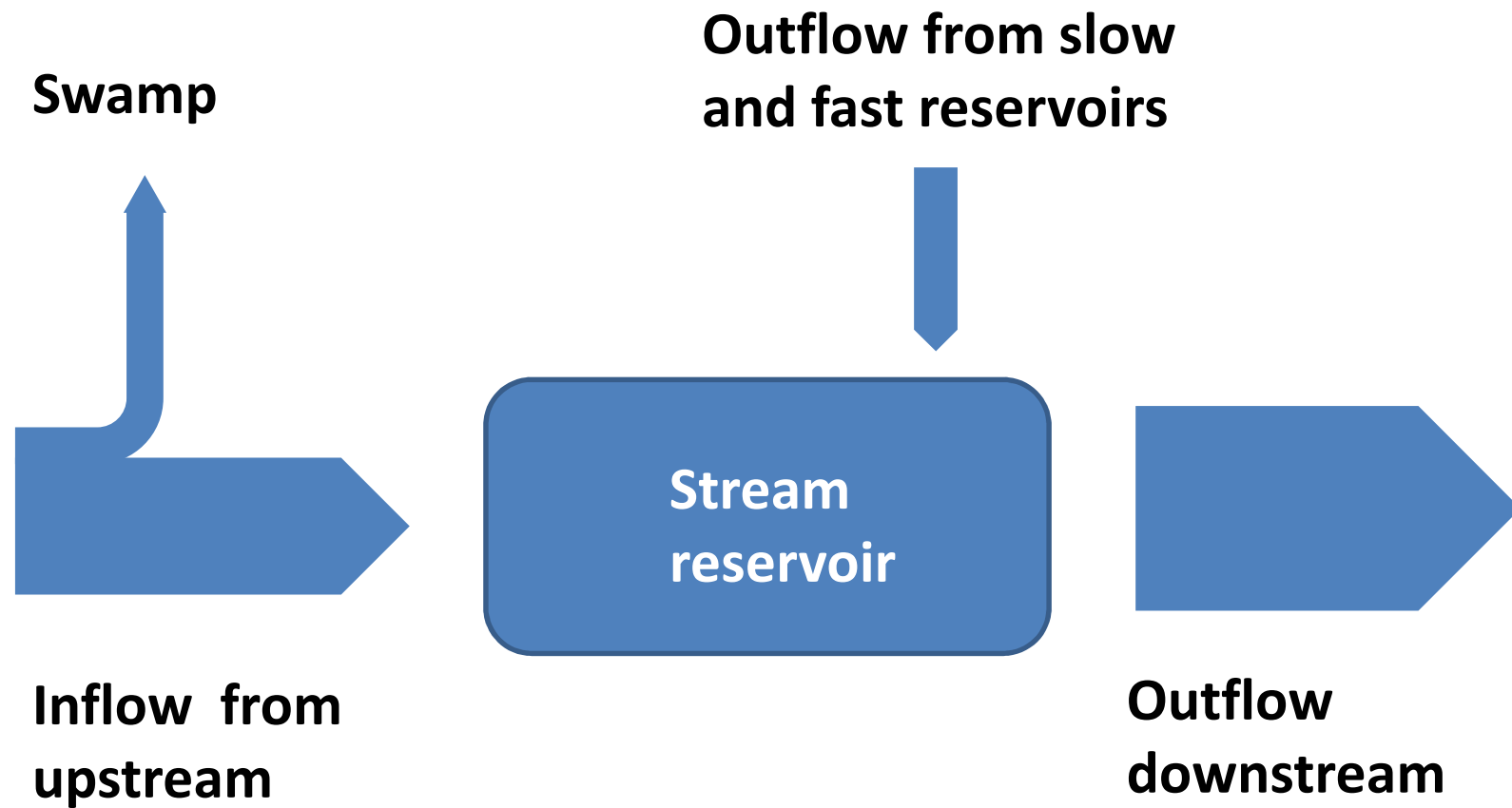
Richey et al., 2002

$25 \times 10^4 \text{ km}^2 = 14 \% \text{ of the Central Amazon Basin}$

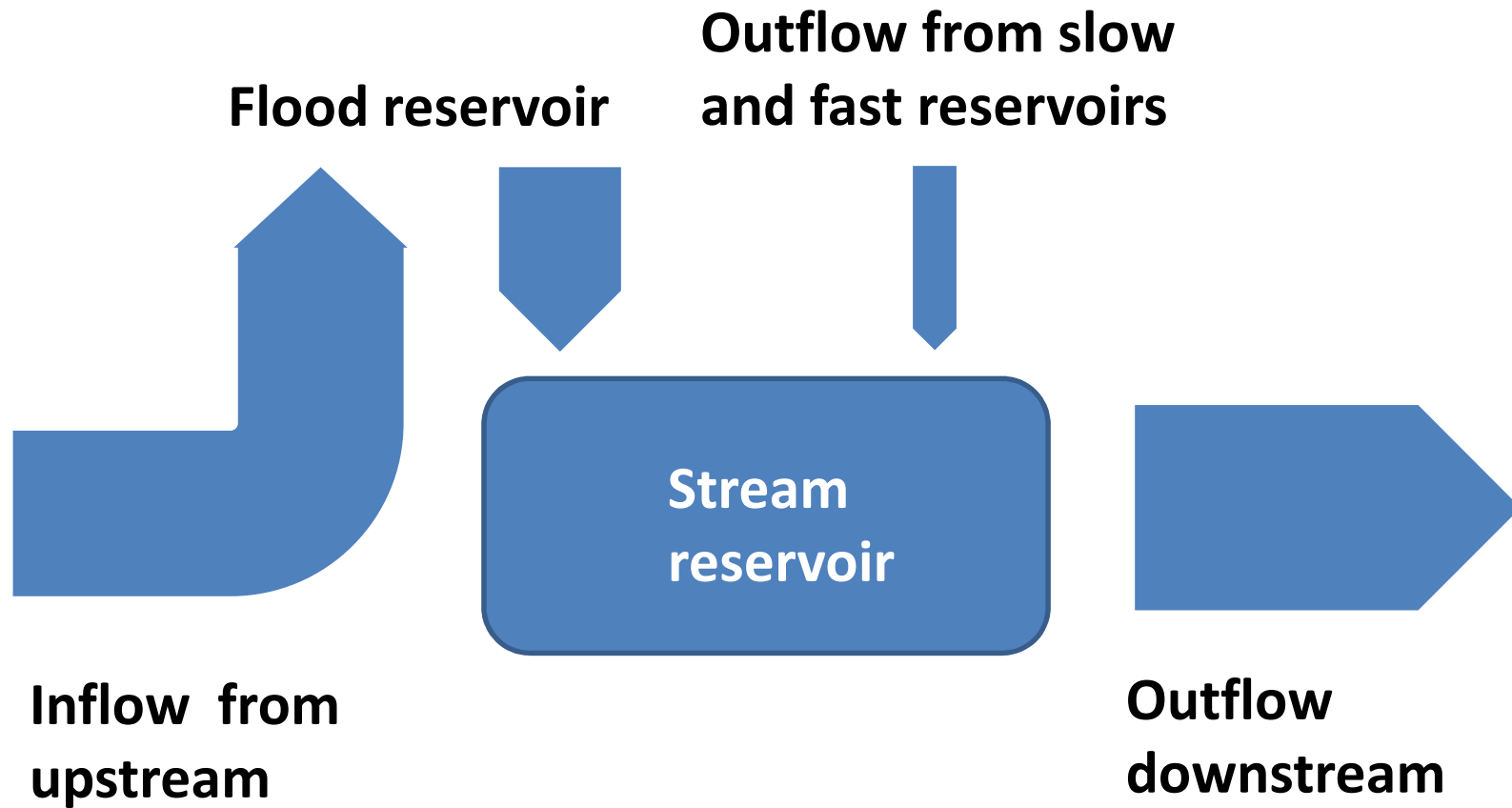
Seasonal flooding – ORCHIDEE TRUNK



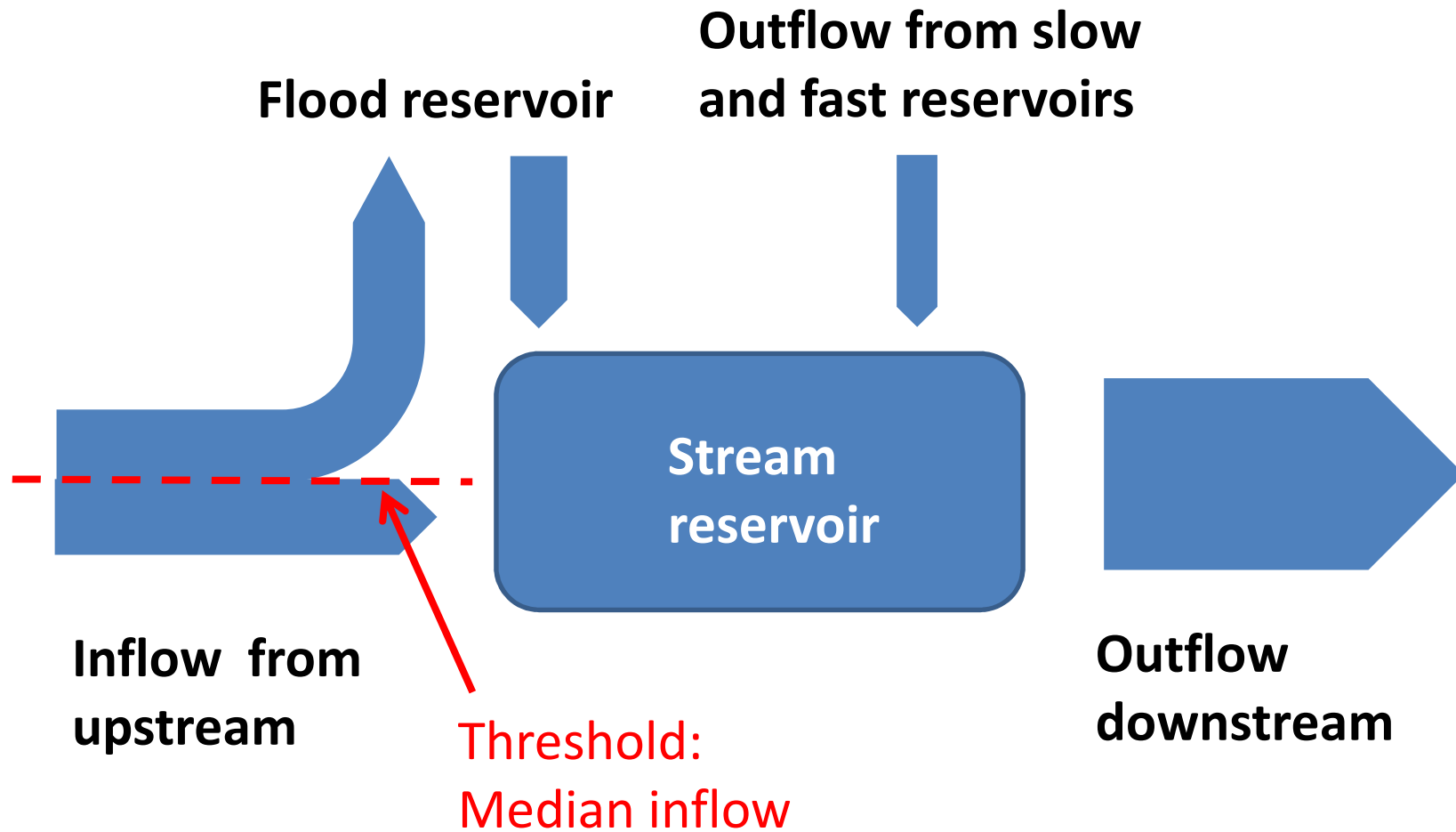
Seasonal flooding – ORCHIDEE TRUNK



Seasonal flooding – ORCHIDEE TRUNK

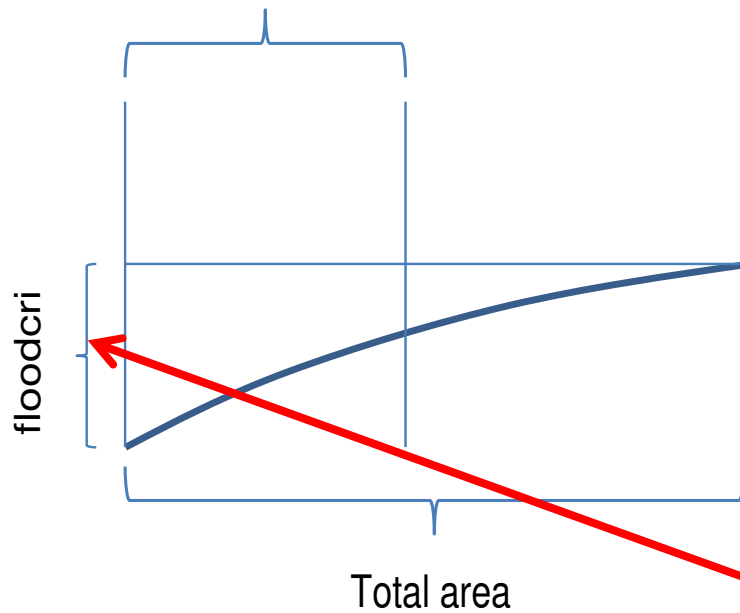


Seasonal flooding – ORCHILEAK

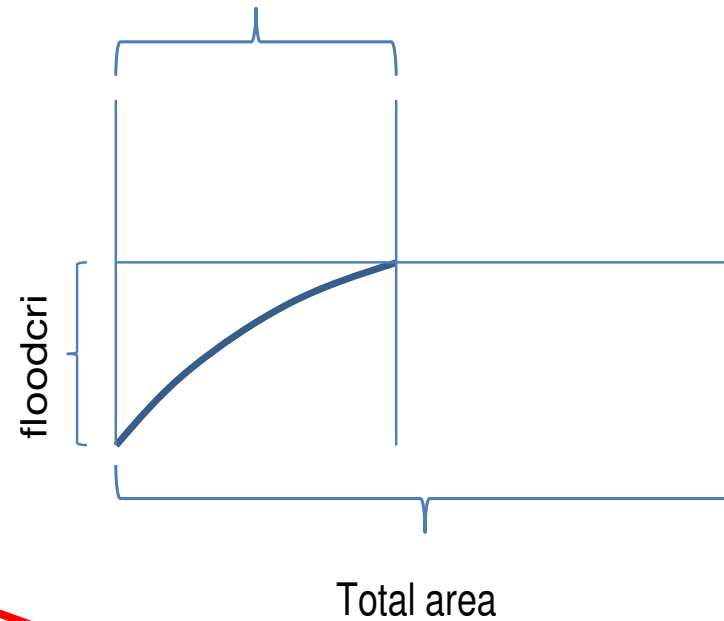


Seasonal flooding

a) Max. floodable area



b) Max. floodable area



$$flood_{frac_{pot}} = \left(\frac{flood\ reservoir * 3}{Total\ area * floodcri} \right)^{\frac{2}{3}}$$

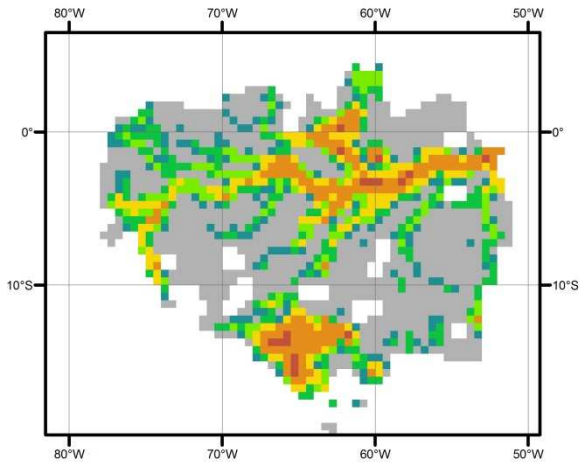
floodcri:

Trunk version: fixed value

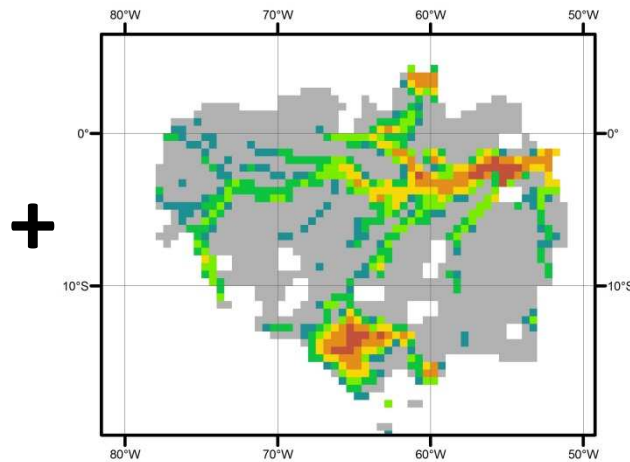
New: from forcing file, 95th percentile of floodheight

Seasonal flooding

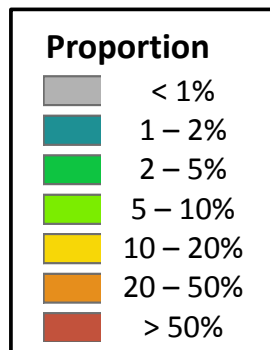
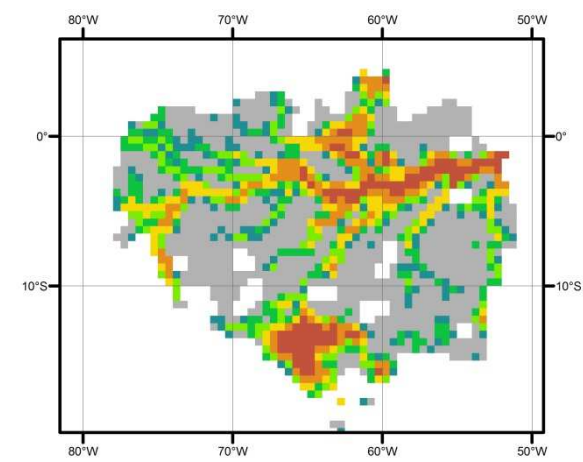
Swamps



Floodplains



New floodplains



Regional forcing data set PRIMA
(Guimberteau et al., 2012)

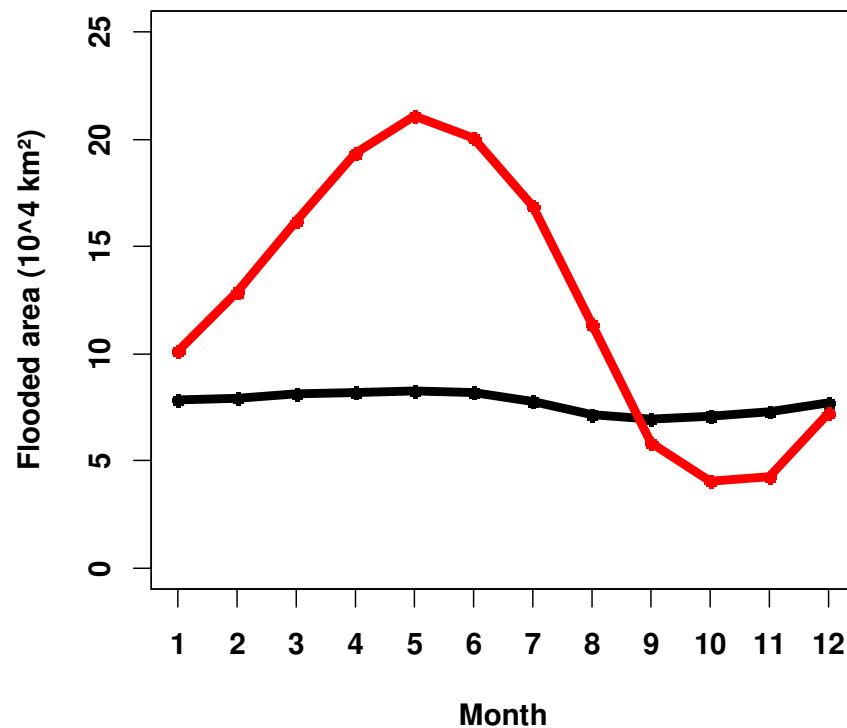
Equals max. Inundation
after Prigent et al., 2001
(spaceborne microwave)

Seasonal flooding

Flooding of the Central Amazon Basin (averages 1995-1997)

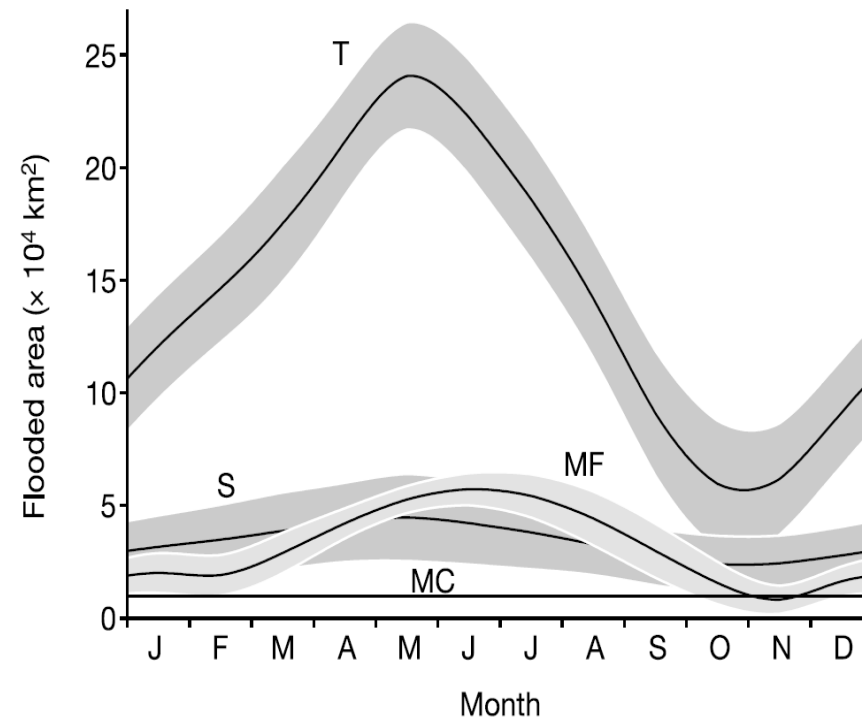
Simulation

Lauerwald et al., GMD, 2017



Simulated flooding – old scheme
Simulated flooding – new scheme

Observation



Richey et al., 2002

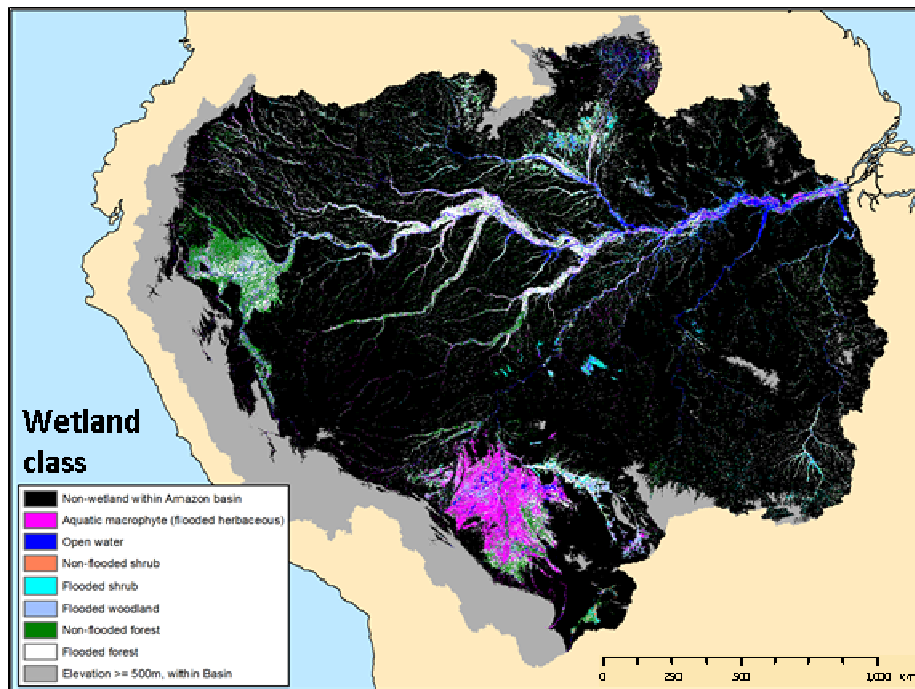
$25 \times 10^4 \text{ km}^2 = 14 \% \text{ of the Central Amazon Basin}$

Seasonal flooding

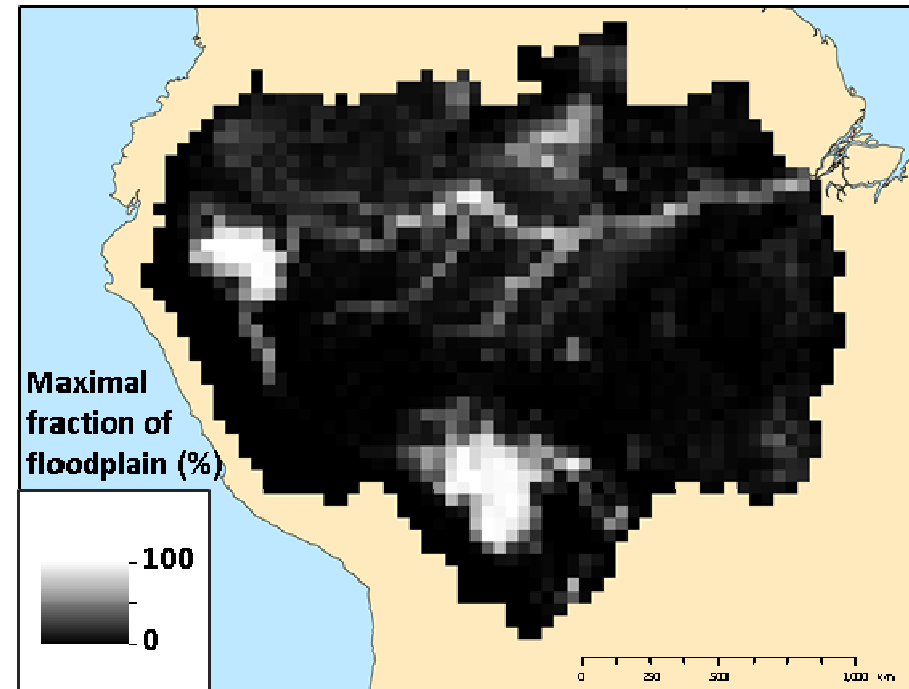
New floodplain forcing by Hastie et al., GCB, 2019

Data set by Hess et al. (2003)

Based on airborne SAR



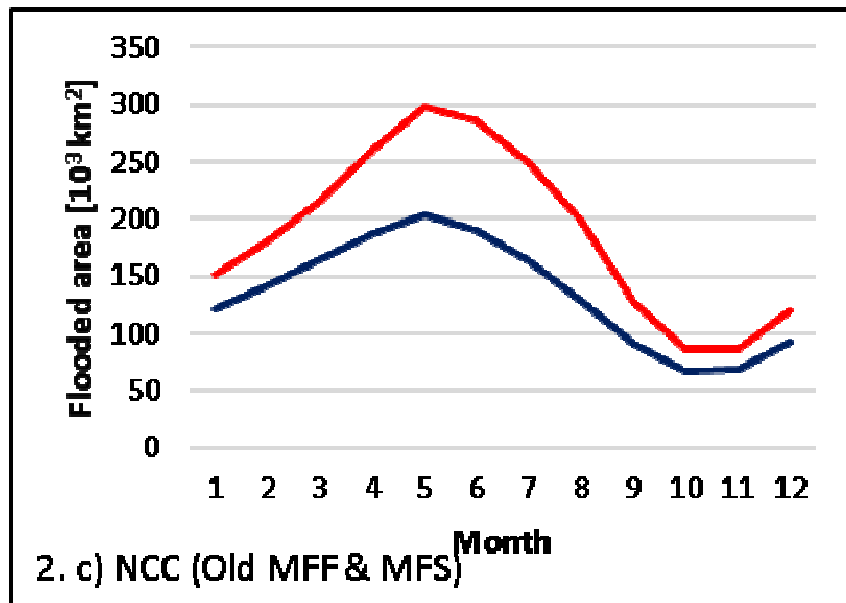
To be used as forcing, aggregated to 0.5° resolution



Seasonal flooding

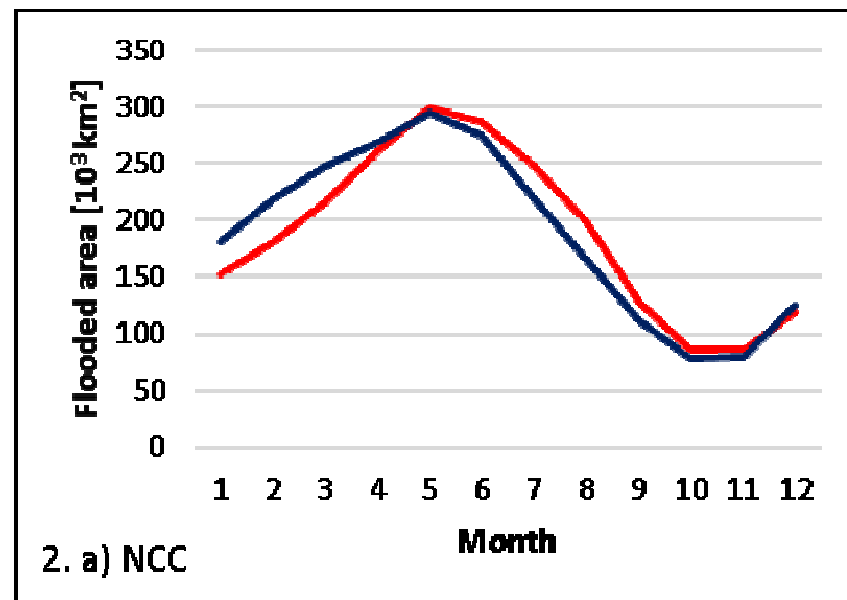
New vs. old floodplain forcing

Lauerwald et al., GMD, 2017



Forcing based on Prigent et al. 2001
(spaceborn microwave)

Hastie et al., GCB, 2019



Forcing based on Hess et al. 2003
(airborn SAR)

Open questions:

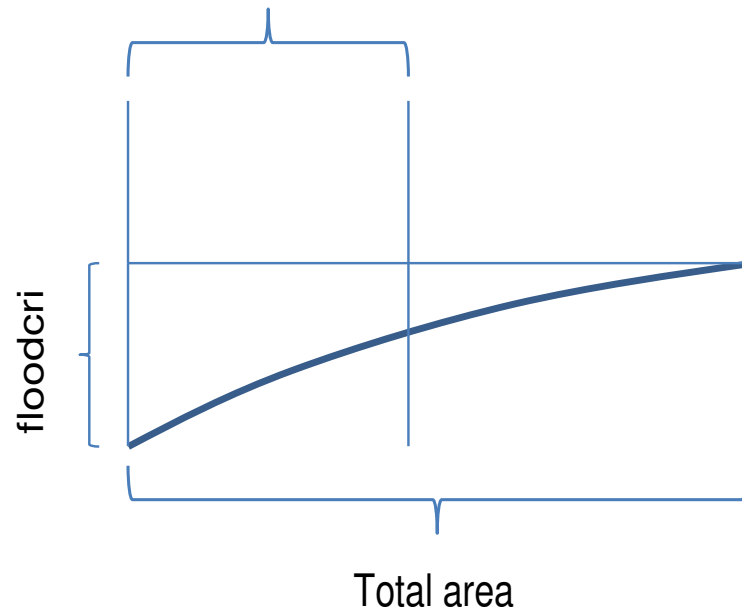
How to define bankfull discharge for rivers outside the tropics?

- Schneider et al. 2011, Journal of Hydrology
 - => Large European rivers have avg. return period of bankfull flow of 0.92 years (while classical methods give usually something around 1.5 years)

Open questions:

Can we apply the same shape of floodplains everywhere?

a) Max. floodable area



Per default: convex shape

However, for most floodplains a concave shape is observed!