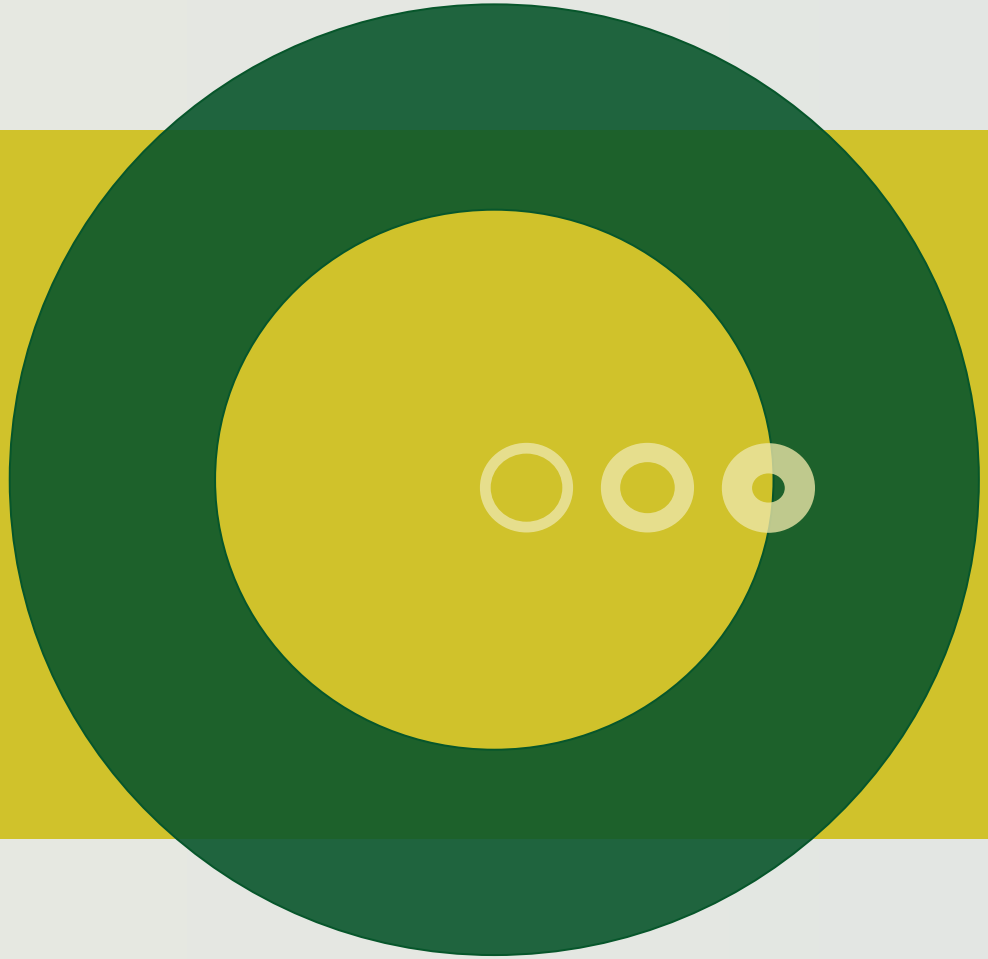
KNOWLEDGE CENTRE FOR AGRICULTURE

Irrigation and WFD in Denmark

Knowledge Centre
for Agriculture



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DLBR
DANISH AGRICULTURAL
ADVISORY SERVICE

Danish Agricultural Advisory Service

- 31 regional advisory companies (3,200 employees)
- Knowledge Centre for Agriculture in Skejby - VFL (500 employees)
  - Communication of knowledge to the agricultural sector
  - Development projects
  - Management programs
  - Owned by the organisation ‘Danish Agriculture’
  - Non-profit

Irrigation in Denmark

- Irrigation on 17 % of the agricultural area in DK
- Irrigation is most important in the western part of DK
  – up to 50 % of the cultivated area has irrigation
  - available water at field capacity is only 60-70 mm on typical soils in this region
- Irrigation is common on farms growing potatoes and on many dairy farms – but also on farms with pig production
- Mainly sprinkler gun irrigation.
- 96 % of all water for irrigation is ground water.

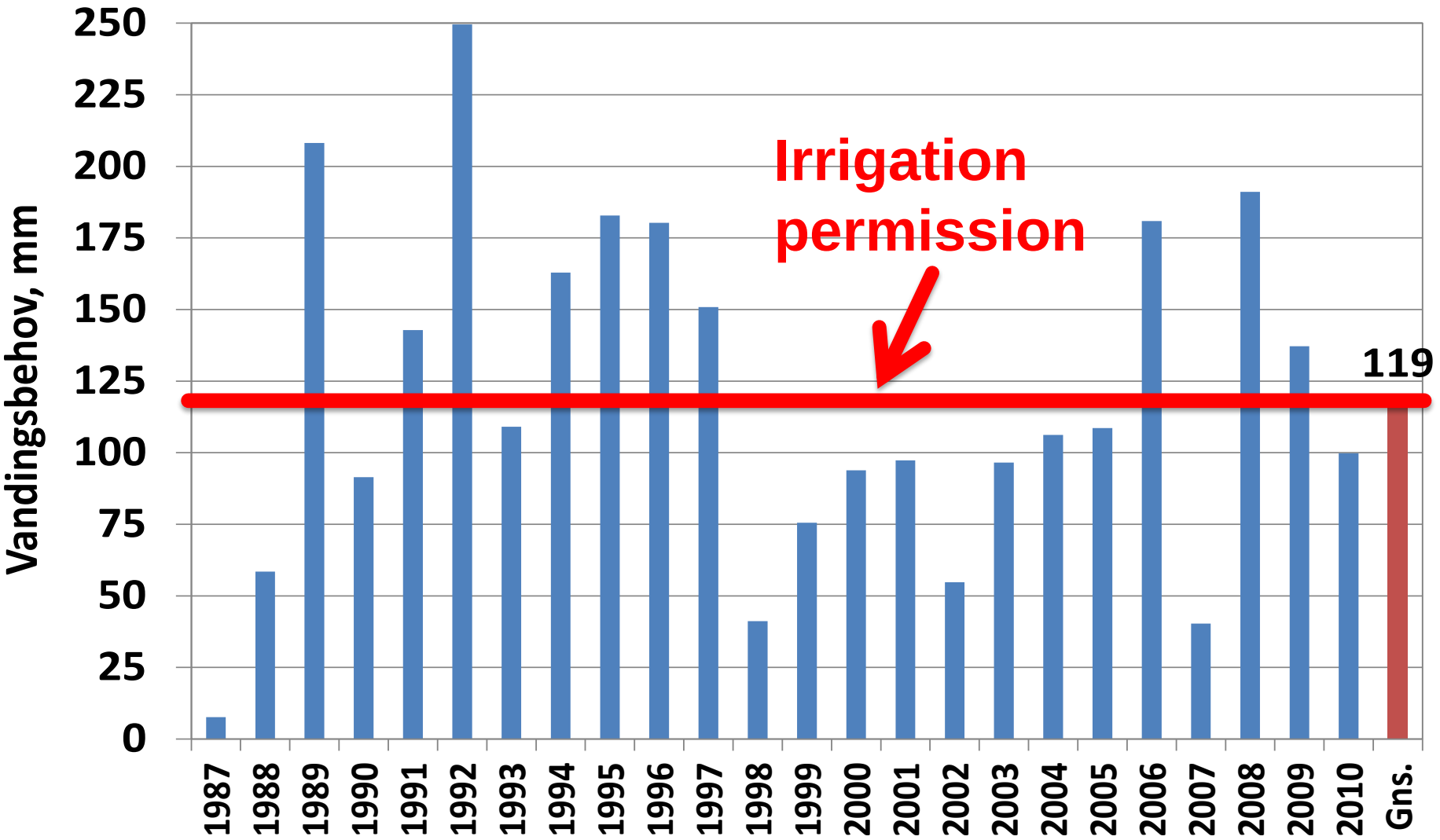
Irrigation permissions

	Per year	
Ringkøbing county	120 mm	1.200 m^3/ha
Other counties – JB 1	100 mm	1.000 m^3/ha
Other counties – JB 3	75 mm	750 m^3/ha

Irrigation permissions are issued for 15 years
Permissions depends on soil type: 750-1200 m^3/ha/year

The permissions corresponds to the <u>average</u> irrigation requirement over a long period of years

Irrigation requirement on dairy farms on coarse sandy soils 1987-2010, mm per year



Irrigation management

- Irrigation decision support tool: Calculation of water deficit and calculation of yield loss if no irrigation water is applied
- Vandregnskab Online is used by advisers and 500 farmers.

Mark	JB	Afgrøde	0 50 100 150 mm	Vandet mm	Balance mm
4-0	1	Vinterhvede		0	-32

	27/5	28/5	29/5	30/5	31/5	1/6	I alt periode
Vandbalancen uden markvanding, mm	-32	-35	-38	-41	-44	-45	
Udbyttetab uden markvanding pr. døgn (pct)	0,4	0,4	0,8	1,2	0,8	0,1	3,7
Tab uden markvanding pr. døgn (kr. pr. ha)	15	19	54	86	57	0	231

Tab uden markvanding er beregnet ved et udbytte på 75 hkg pr. ha og en afgrødepris på 130 kr. pr. hkg.

Administration of permissions for groundwater abstraction for irrigation

- Abstraction of water for irrigation has a lower priority than abstraction of water for other purposes
- Abstraction of water for irrigation is already limited in many areas due to exceeded impact on stream flow
  - No new permissions are issued
- Implementation of the Water Framework Directive may result in further restrictions on irrigation
  - Maybe less water can be used for irrigation in some areas in the future

Less water for irrigation?

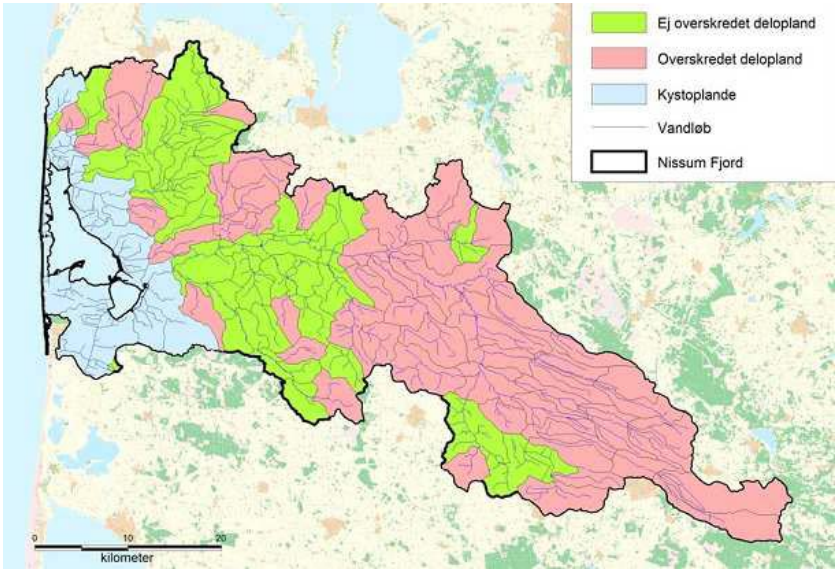
- In the western part of DK ground water resources are sufficient (Precipitation per year: 800-1100 mm)
- Too big reductions in stream flow are critical for ecosystems in streams and rivers
- Permissions for irrigation are limited by a requirement related to a maximum reduction of low flows in streams (typical 10 % of median minimum flow)
- Lowering of the ground water table may be critical for some wet terrestrial ecosystems.

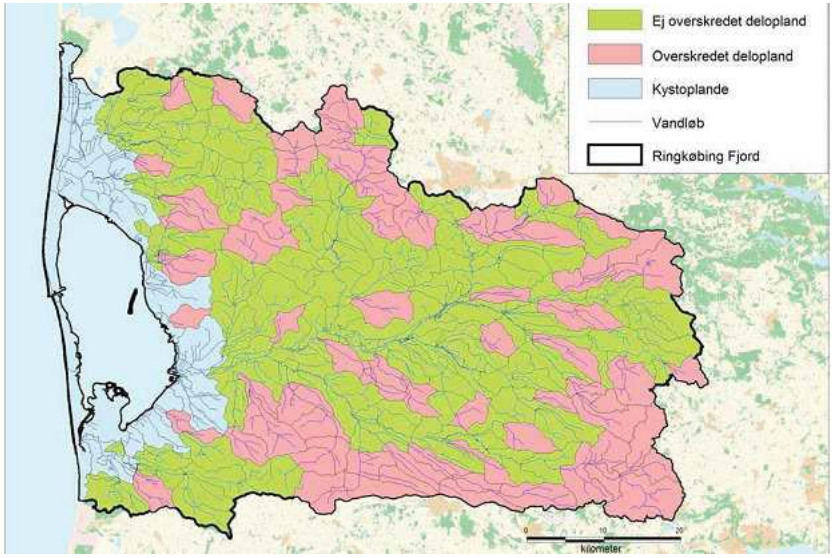
Requirement values for maximum effect of the water flow in streams

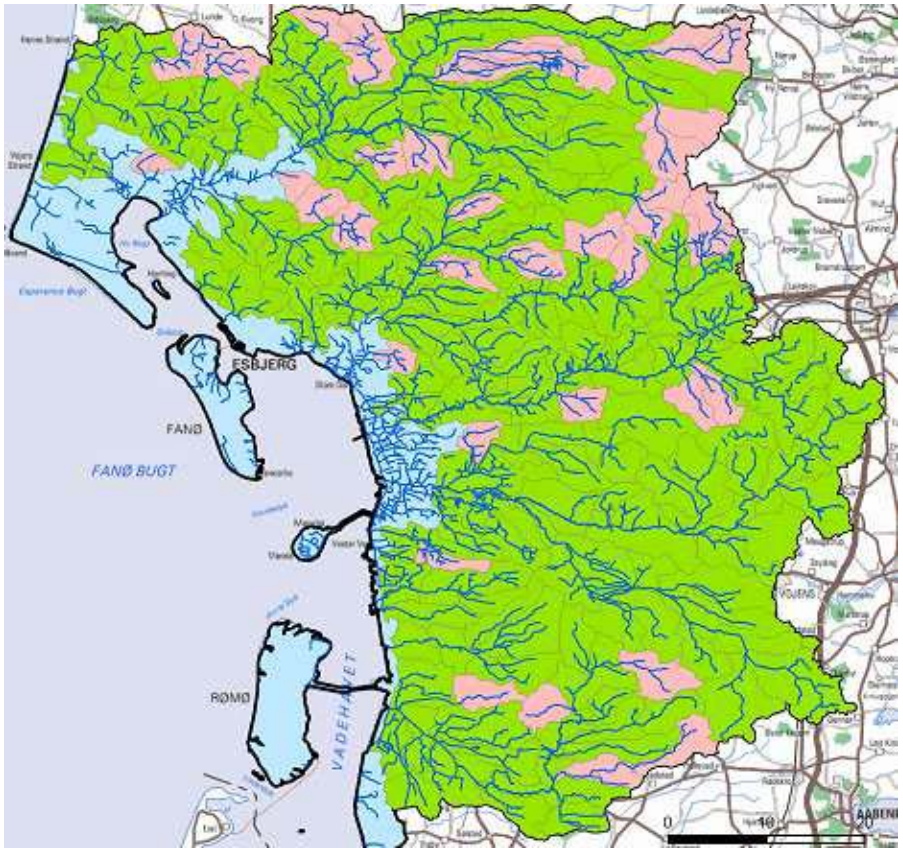
High ecological status		**5 %**
Good ecological status	**Small streams < 2 m width**	**10 %**
	Streams > 2 m (spawning and juvenile growth of water salmonids or protected species/nature)	**10 %**
	Other streams > 2 m width	**15 - 25 %**

- Requirement values are from 1979 (MST Water supply Instructions1979).
  Scientific basis missing.
- The same for all streams. Automatic linkage to stream objectives.

Red areas: Reduction of irrigation?





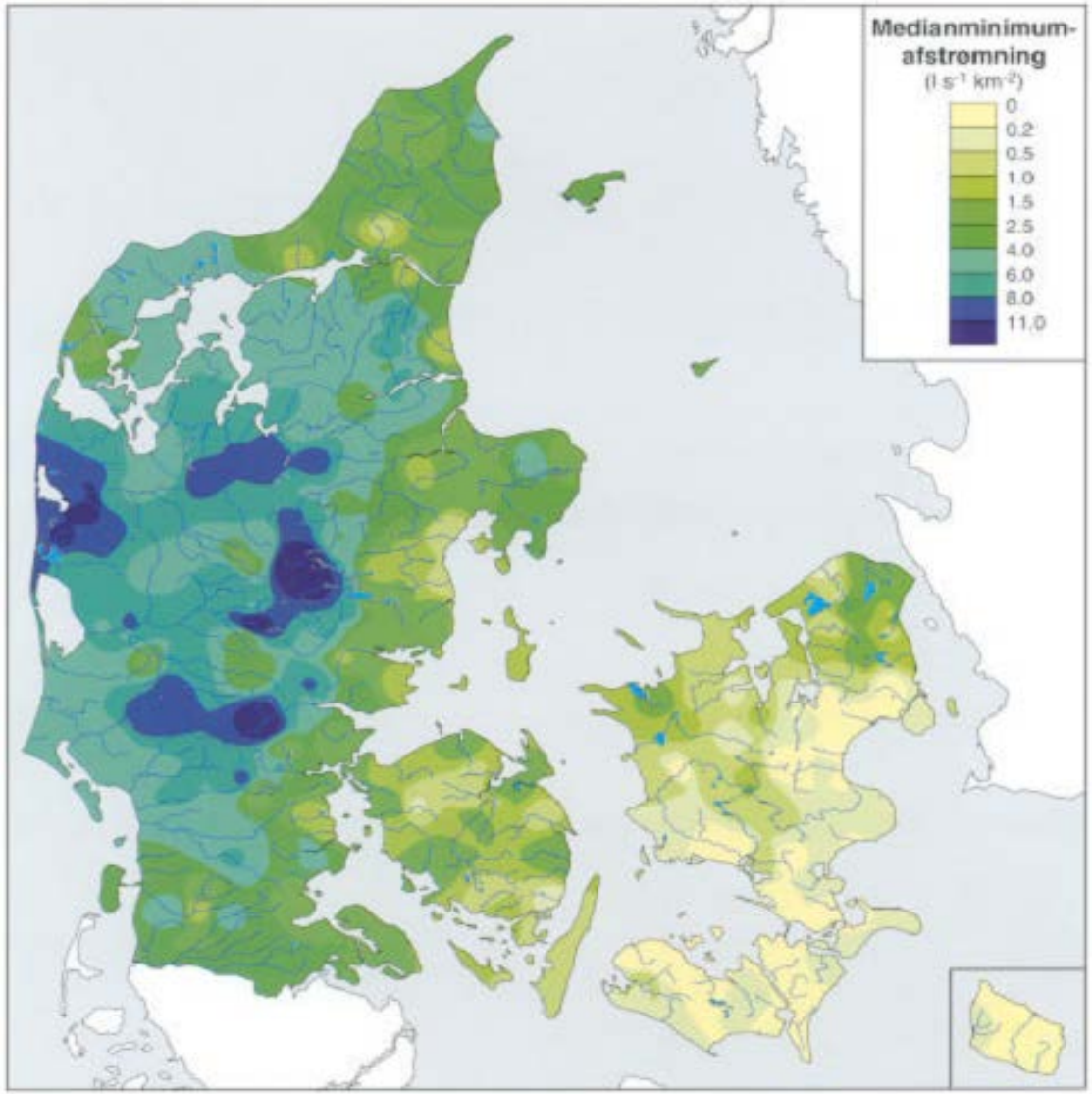


From draft versions of water plans for 2009-2015

”Irrigation” has been postponed to the next generation of WFD plans (2016)

- New calculations (new method) of the impact on stream flow from abstraction of ground water are prepared in 2014 (next generation of WFD plans)
- New limits for maximum reduction of stream flow are also under preparation

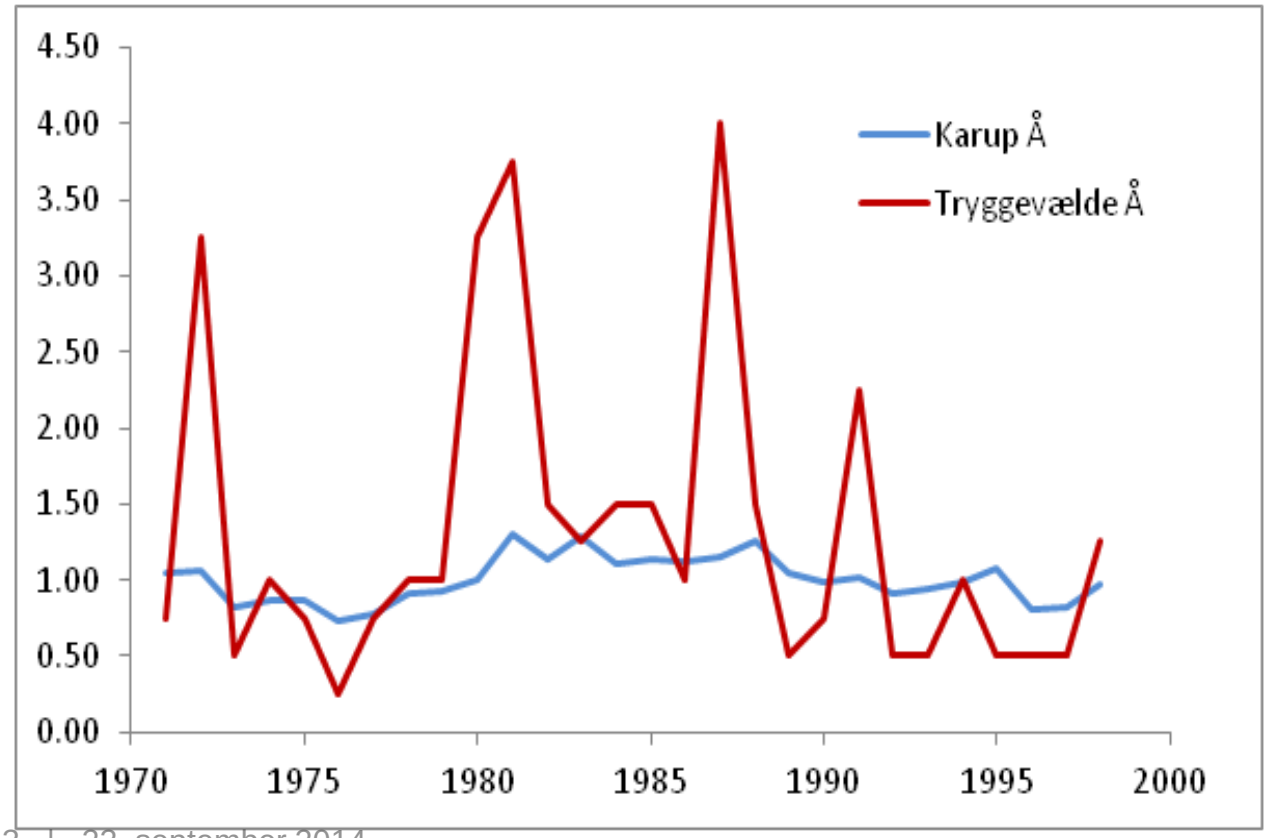
Very water rich streams in Western Jutland in the summer



Water flow (medianmin.) is 5-20 times larger per unit of area in Western Jutland than in the eastern part of Denmark, l/s per km^2.

Stable water flow in the summer in streams of western Jutland

- Karup å: 8,0 l/s per km^2 = 66 % of average run-off
- Tryggevælde å: 0,4 l/s per km^2 = 6 % of average run-off



The annual rainfall has increased in Western Jutland

The annual rainfall has increased by 266 mm in 100 years!