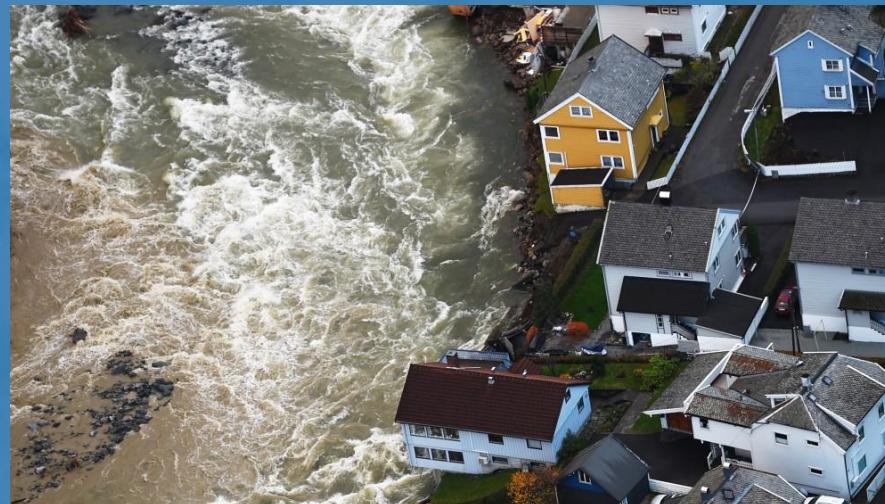


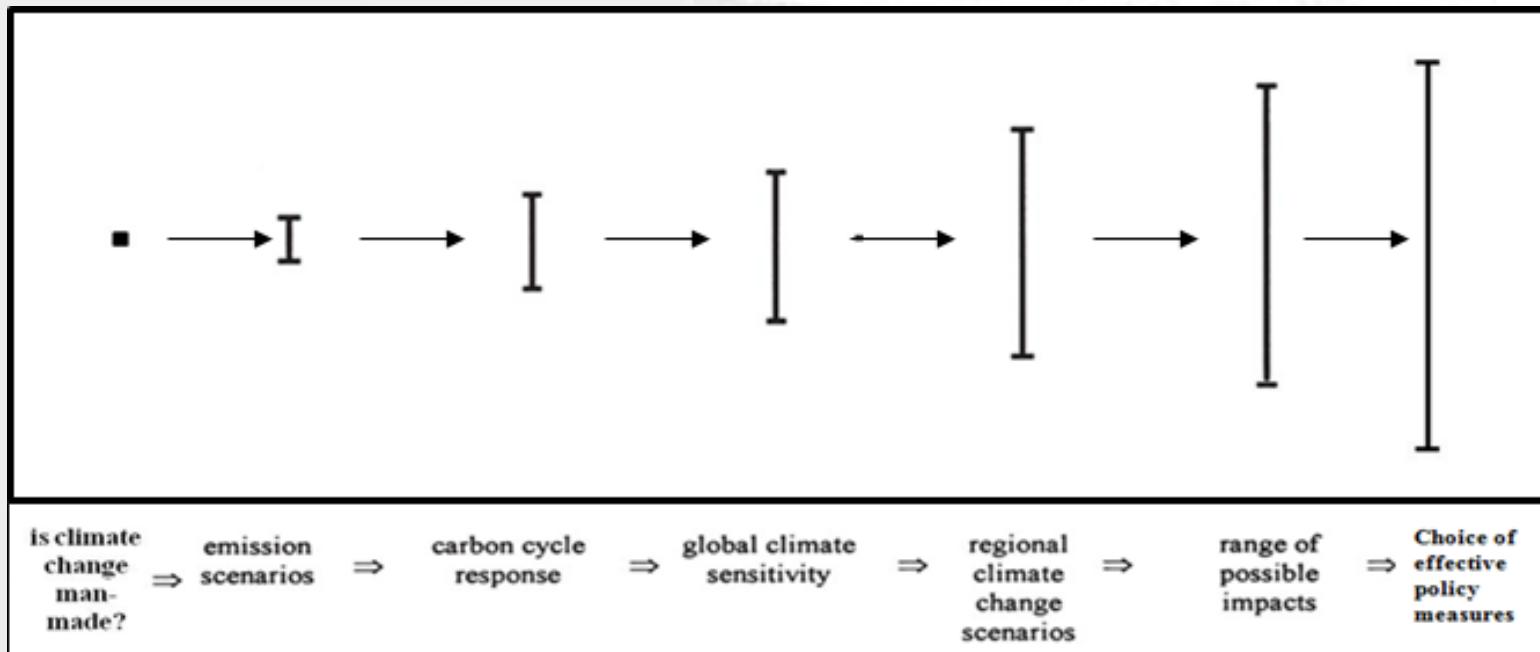
The ways, prospects and problems of including local knowledge in analyzing climate change risks and vulnerability

Presentation at the Autumn school on Co-production of Climate Adaptation Research.
Organised by University of Bergen, University of Leeds, Norce, Norsk klimaservicesenter
and Norsk senter for bærekraftig klimatilpasning (Noradapt)

Mjølfjell 20-25 October 2019

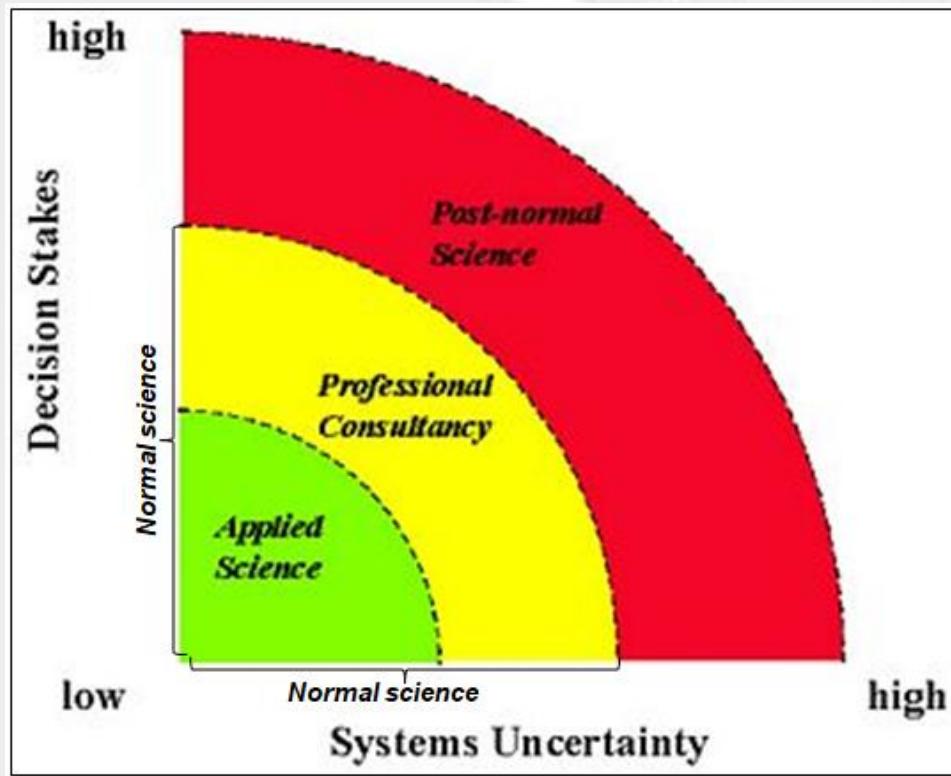


The extent of uncertainty: Determining the need for expanding or limiting the extent of co-production of knowledge?



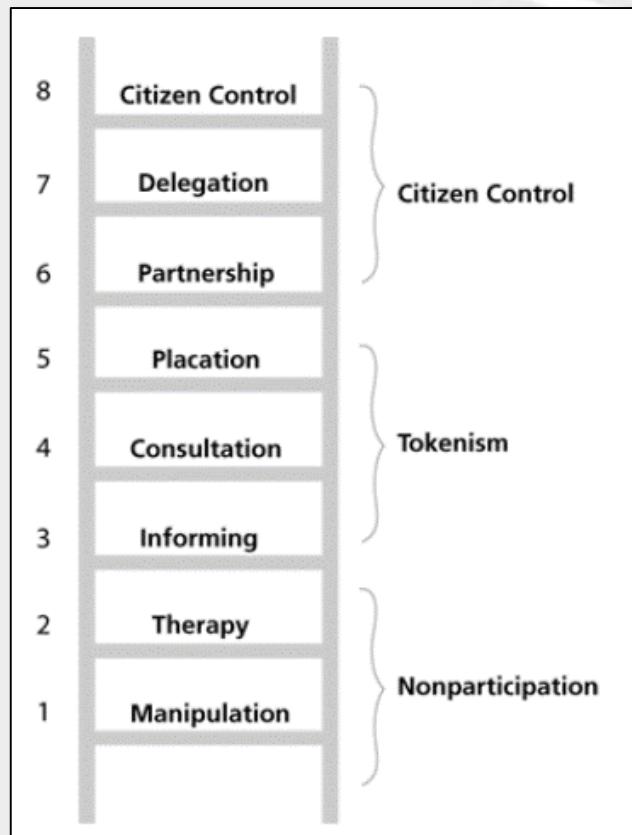
Adopted from: Schneider, 1983; Jones, 2000; Schneider and Kuntz-Duriseti, 2002

Climate policy: the case of moving from “normal” to “post-normal” science



Post-normal science implies there must be an extended peer community consisting of all those affected by an issue who are prepared to enter into dialogue on it. They bring their extended facts, that will include local knowledge, and (in some cases) also materials not originally intended for publication (such as leaked official information)

Co-production of knowledge and participation in local planning



Arnstein, 1969

- Too much focus on the relationship between citizens and local authorities and the question of citizen participation?

- Should we attain more focus on the relationship between local authorities and private business?

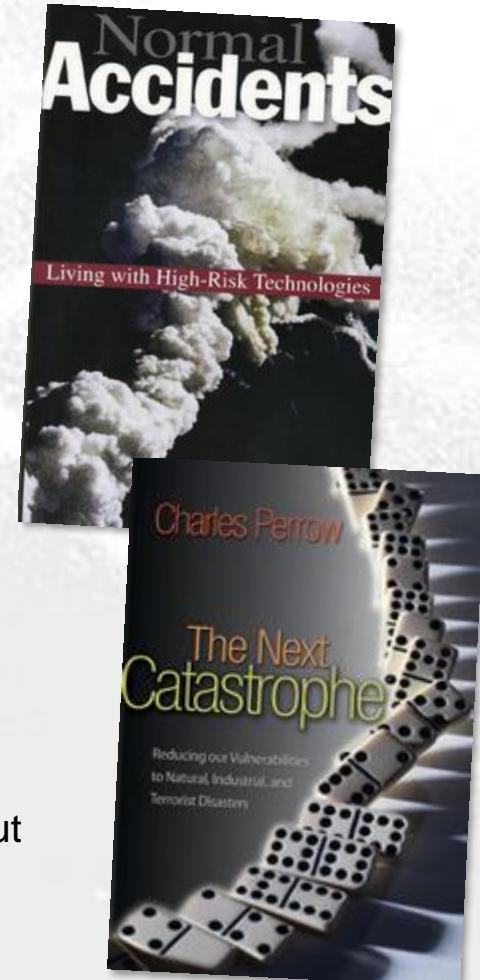
Nystad, 2013

- Furthermore, it is crucial to identify how governing paradigms may determine both the way and extent co-production processes manifest themselves and the outcome of these

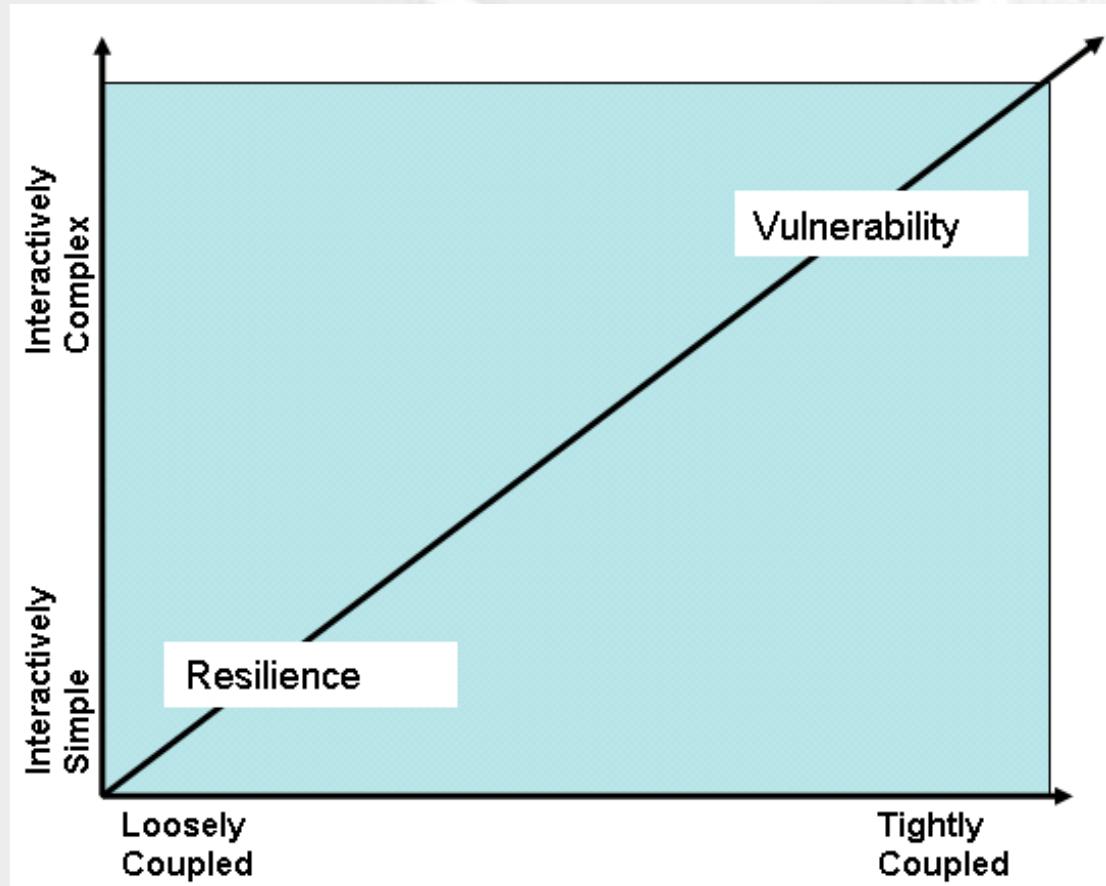
Aall mfl, 2016

Charles Perrow: Theories on risks and vulnerabilities

- **High-risk enterprises**
 - Nuclear power, Petrochemical plants, Aircrafts
- **High-risk technologies**
 1. Part (the smallest components)
 2. Unit (a functionally collected unit of parts)
 3. Subsystem (an array of units)
 4. System
- **High-risk society**
 - Accidents are inevitable due to *interactive complexity* of the system
 - When the system is *tightly coupled*, failures more easily get out of control



The resilience - vulnerability matrix



Perrow, 1984; 2007

Applying Perrow to climate change adaptation and local planning

High-risk technology

System
Nuclear power plant

Surroundings
Environment

Subsystem
Secondary cooling
system

High-risk community

System
Vulnerability range

Surroundings
Society

Subsystem
Peril range (directly
endangered or affected
area)

High-risk planning

System
Planning regime

Surroundings
Governance

Subsystem
Local land-use plan
(covering the risk-area)

Tight and loose coupling tendencies

Tight coupling	Loose coupling	Comments in light of climate related natural hazards events
Delays in processing not possible	Processing delays possible	Time factor is often crucial, especially when a large population is endangered
Little slack possible in supplies, equipment, personnel	Slack in resources possible	Loose couplings give more room for improvisation in times of crises
Buffers and redundancies are designed-in, deliberate	Buffers and redundancies fortuitously available	Natural hazards zonings are often pushed to their limits, leaving small buffers, especially in densely developed areas
Substitutions of supplies, equipment, personnel limited and designed-in	Substitutions fortuitously available	Loose couplings give more room for improvisation in times of crises

The October flood incident in 2014

Odda

- Flood destroying 5 residential homes, public roads, bridges etc - with a total damage cost of aprox 100 mill. NOK



Voss

- Flood destroying major public buildings (e.g. Voss Cultural Centre), public roads, bridges etc - with a total damage cost of aprox 450 mill. NOK



Flåm

- Flood destroying 12 residential homes, public roads, bridges etc - with a total damage cost of aprox 250 mill. NOK + damage cost relating to reconstructing the 12 residential homes



Lærdal

- Flood destroying cultivated land, public roads and bridges - with a total damage cost of aprox 6 mill. NOK + damage costs of restoring damaged cultivated land

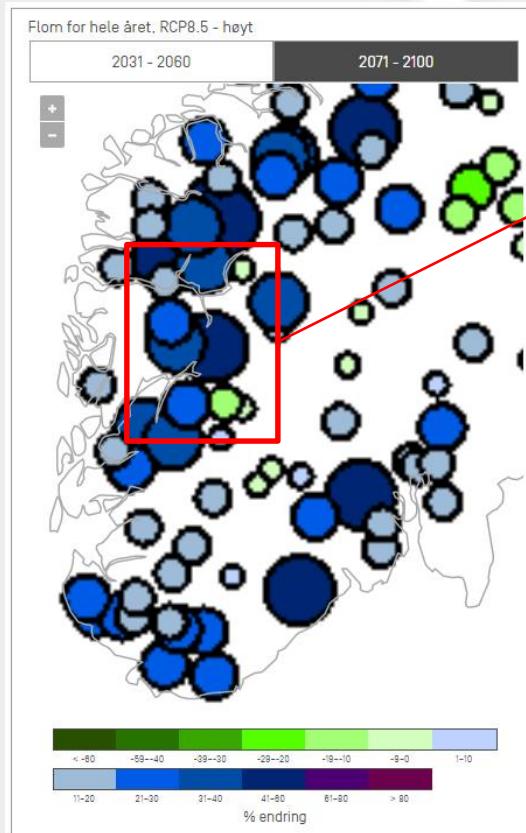


Prior to the 2014-incident: The Noradapt project and the co-production of climate risk and vulnerability scenarios

- **2006-2011 The Noradapt project**
 - The first large-scale Norwegian research and development project on analysing climate risks and vulnerabilities and developing adaptation strategies; Voss one of 8 municipalities)
- **The (simplistic) Noradapt co-production model:**



The 'science' of climate change adaptation and flood related land-use planning

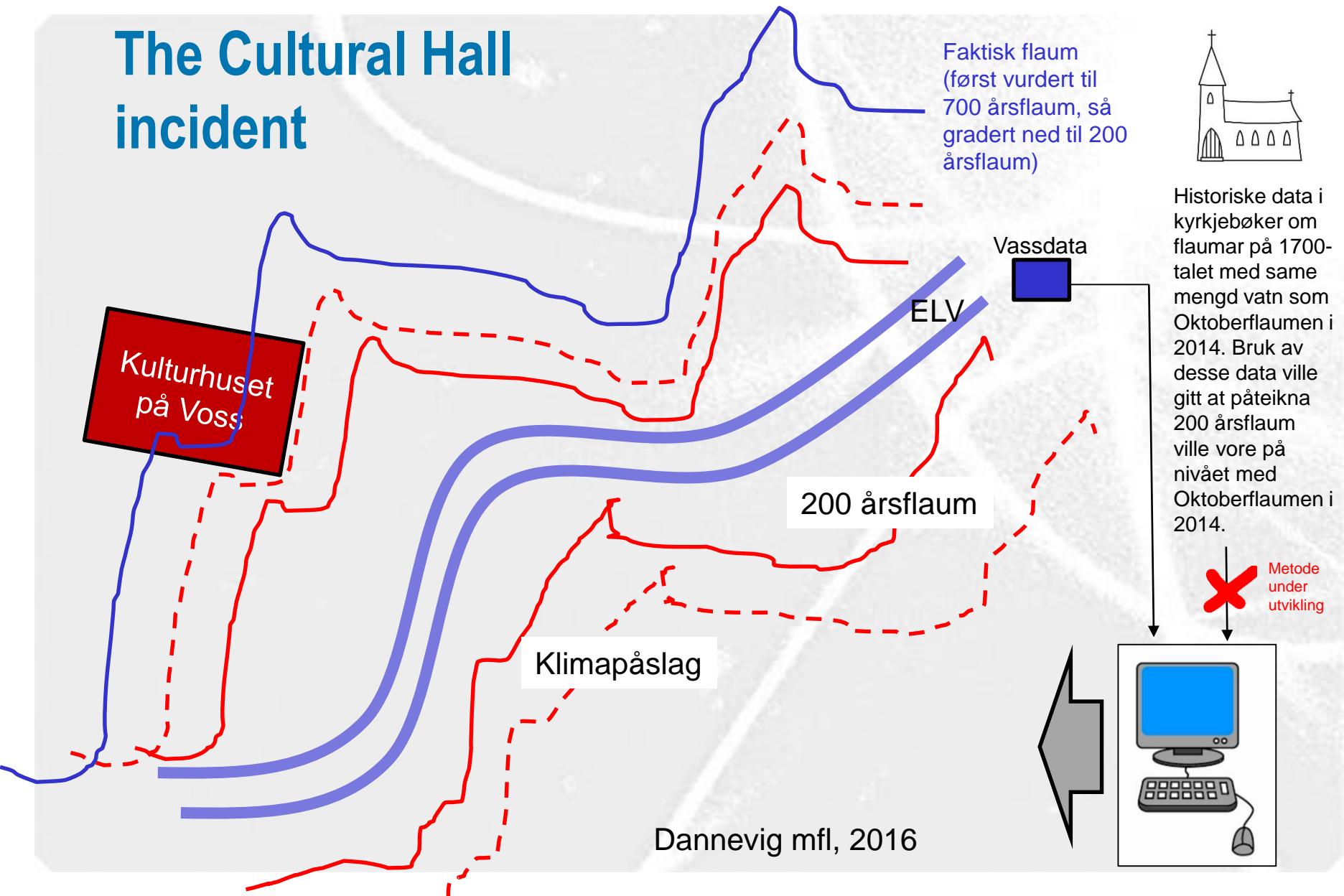


NVE har laget flomsonekart, noen med innarbeidet hensyn til klimaendringer vha en «standard klimafaktor» på +20%/+40%.



Kartet viser endring i 200-års flom (%) fra perioden 1971-2000 til 2071-2100 for 115 vassdrag i Norge. En 200-års flom er en flom som i gjennomsnitt vil opptre en gang hvert tohundre år dersom klimaet ikke endrer karakter. Det betyr at det er 0,5 % sannsynlighet for at en slik flom vil opptre i et gitt år. Detaljer om endringene som vises i kartet, står i rapporten "Klima i Norge 2100", side 123.
<https://klimaservicesenter.no>

The Cultural Hall incident

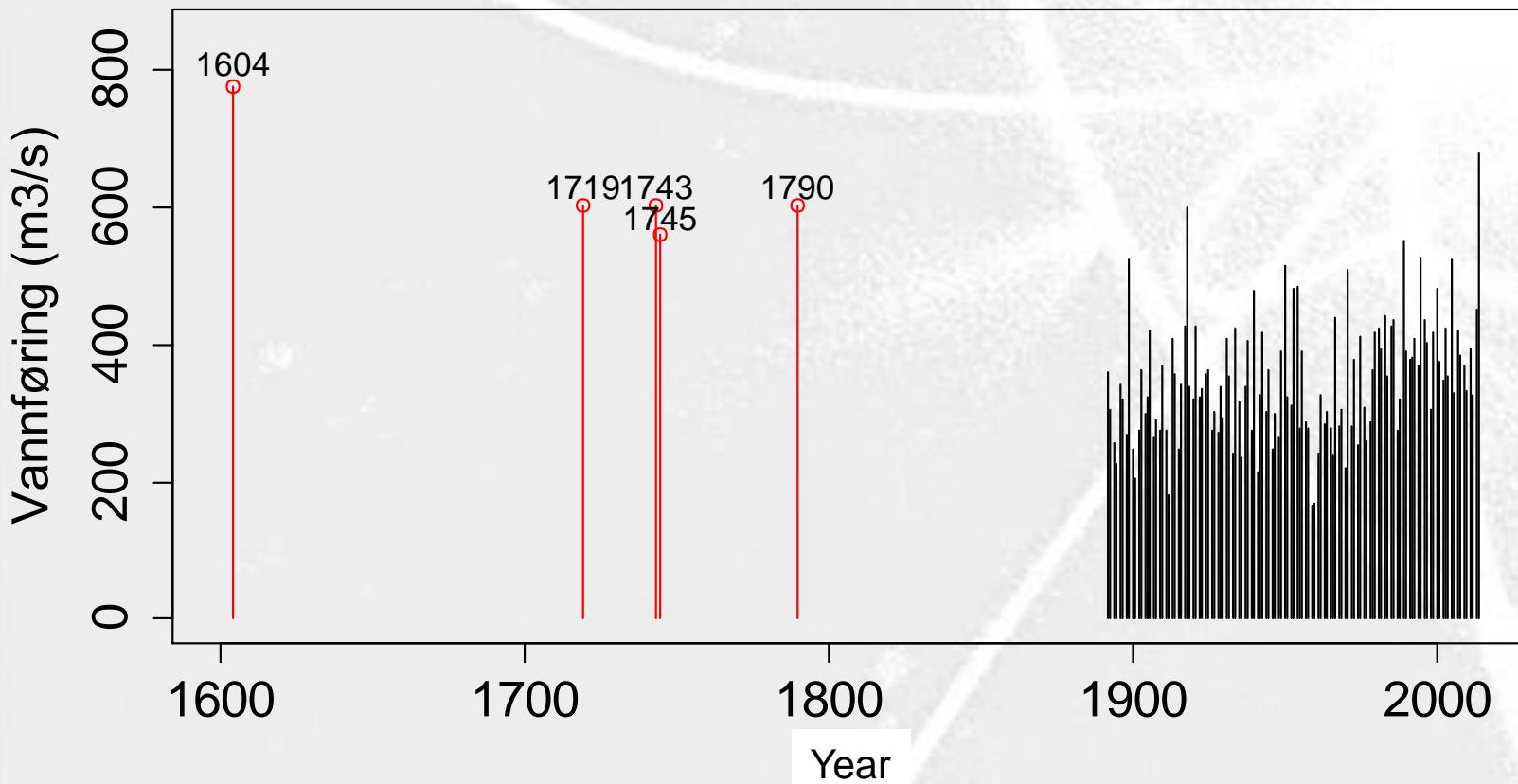


Voss oktober 1918



Foto: S. Ulvund

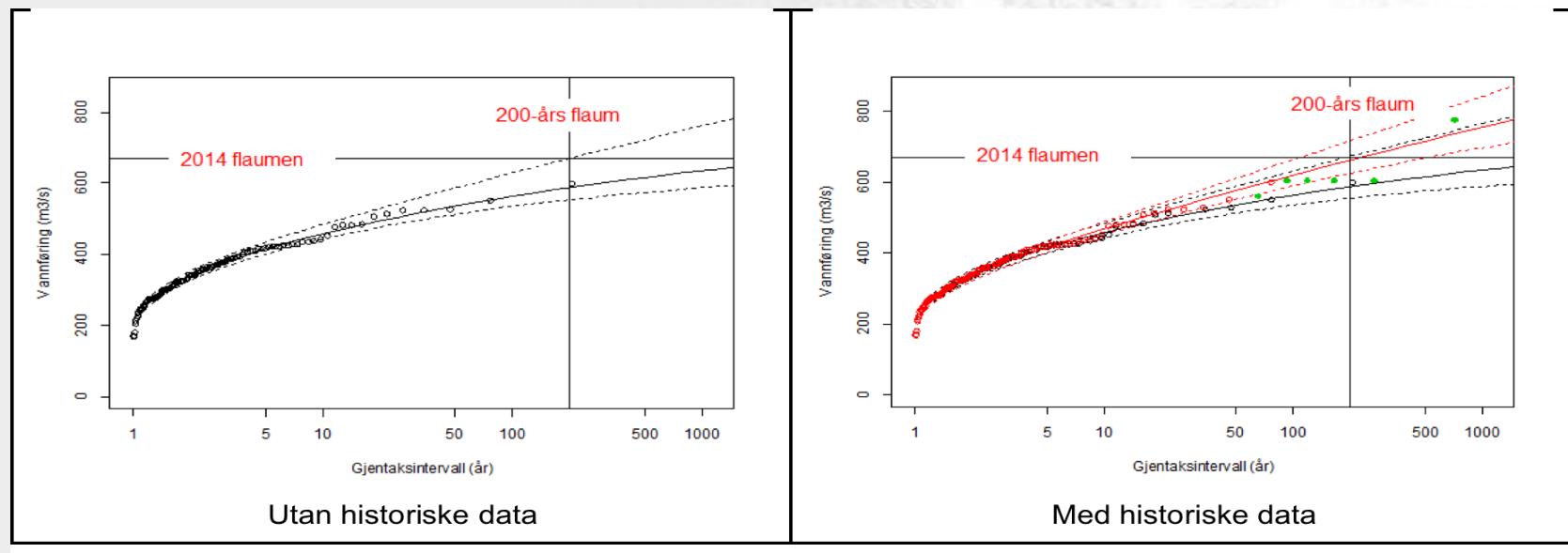
Floods in Voss



Engeland, 2015

Co-producing adjustments of ‘formal science’

Nivå på 200 års flom i Vangsvatnet, Voss, før og etter inkludering av historiske flomdata. (Modifisert fra Engeland 2015)



Engeland, 2015

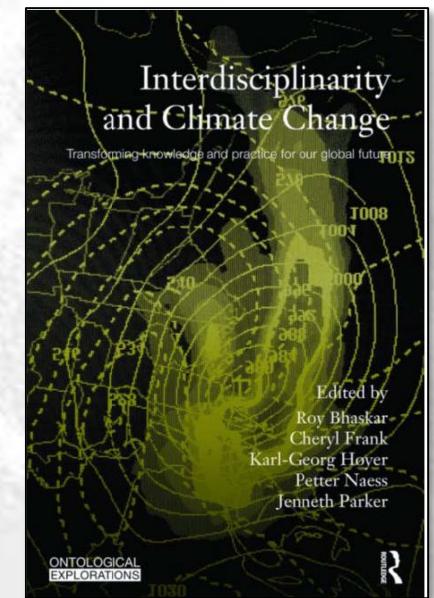
Tar vi også inn informasjon fra historiske data ser vi at den dimensjonerende flommen øker med 11%, dimensjonerende vannstand øker med 0.5 meter og at 2014-flommen ligger godt innenfor et 95% konfidensintervall for 200-års flommen.

Conclusion

- **The planning system is in itself a tight coupled and high-complex social technology that calls for a scientific approach defined by detailed and standardized “one-size-fits-all” national regulations**
 - This might imply a ‘predict-then-act’ modus operandi that can lead to no-action in anticipation of accurate and scientific data to be presented, with purely developed procedures of including local and tacit knowledge
- **The ‘standard’ (an obligatory by law) citizen involvement in land-use planning is staged within the existing ‘predict-then-act’ technocratic approach to land-use planning**
 - Thus, ‘more’ co-production does not necessarily ensure a ‘better’ climate change adaptation, it can also imply just creating public support for reproducing “not-so-good” adaptation strategies
- **Way ahead**
 - Change the paradigm of analysing and adapting to climate change risks and vulnerability?
 - And/or
 - Change the way co-production of knowledge is staged?

The climate-reductionism of the environmental debate - and how to counteract this situation

- **CO₂ reductionism in current climate policy**
 - Climate gas issues are reduced to CO₂
 - Energy issues are reduced to CO₂
 - Environmental issues are reduced to CO₂
- **Counteraction: Seven thesis on reconstructing the climate and sustainability debate**
 - Reuniting CO₂ with other Greenhouse Gases
 - Reuniting CO₂ with Fossil Energy
 - Reuniting CO₂ with Energy
 - Reuniting CO₂ with Consumption
 - Reuniting CO₂ with Economic Growth
 - Reuniting CO₂ with Sustainable Development;
 - Uniting CO₂ with the Post-Carbon Society



Høyér, 2010

+ Climate change adaptation!

From «shallow» to «deep» adaptation

Widening climate change adaptation

Forsterke eksisterande
tiltak for tilpassings til
eksisterende klima

Nye tiltak retta inn mot
tilleggseffekten av eit
endra klima

Fokusere på sumeffekter
av klimaendring og
andre endringer ved å
forsterke eksisterande
miljøtiltak

Deepening climate change
adaptation

Tiltak retta inn mot å endre drivarane i samfunnsutviklinga som kan
auke eksponeringa for negative påverknad frå «klima»

Auke i
folketal

Auke i
mobilitet

Auke i
sentralisering

Økonomisk
vekst

osb

From «shallow» to «deep» adaptation – and what role can co-production of knowledge play here?

Widening climate change adaptation

Forsterke eksisterande
tiltak for tilpassings til
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