



# A Nordic-wide GIS analysis of adaptive capacity for agriculture

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# Outline

- Aims
- Socio-economic indicators/adaptive capacity
- Data collection and challenges
- Nordic harmonisation
- Preliminary results
- Extension

# Aims

- To identify indicators of adaptive capacity in the agricultural sector to climate change
- Replicate previous efforts from Norway (O'Brien et al 2003, 2004, 2006) as a first step
- Extend approach to develop means to assess vulnerability of agriculture across the Nordic countries
- Future projections (employment, demography)
- Practical applications – building awareness, scope for developing common adaptation responses?

# Indicators of adaptive capacity

From O'Brien et al. 2003

- Employment in the sector (primary sector= agriculture, agriculture + forestry)
- Tax base + Government budgetary transfers
- Age distribution – proportion of elderly (aged 50-66) out of the working population (aged 20-66)
- Migration
- Dependency rate
- (growth in the sector)

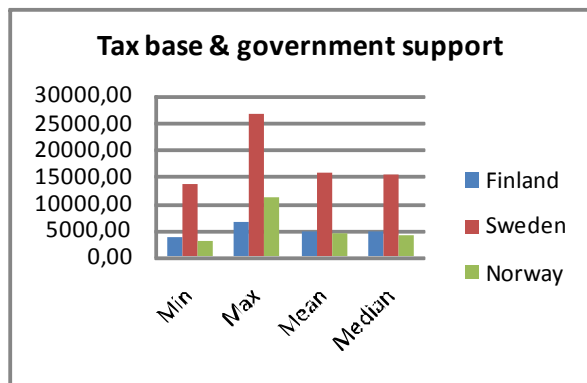
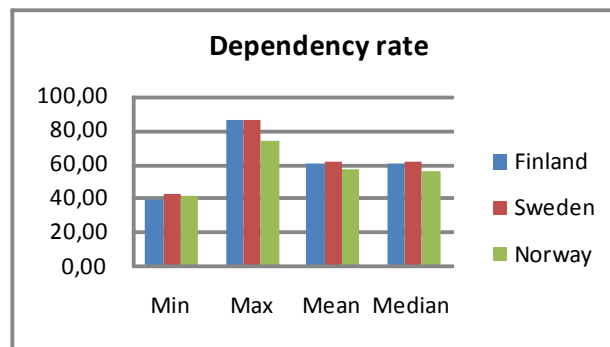
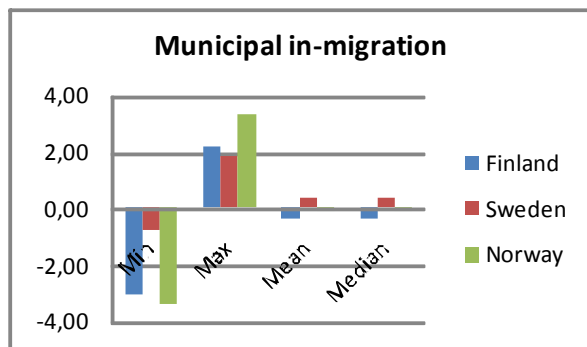
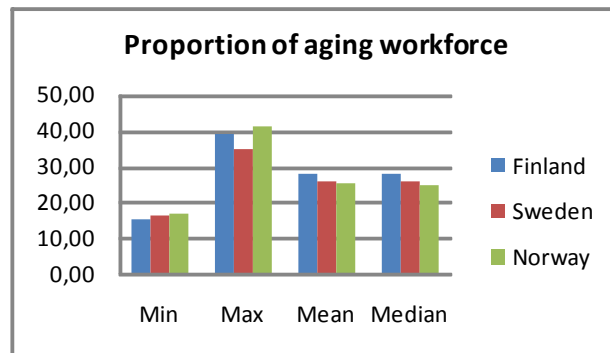
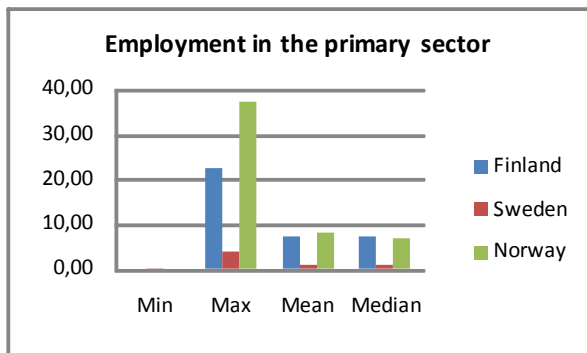
# Data collection and challenges

Social sensitivity	Economic factors	Demographic factors
Employment	Tax base	Age distribution
	Government budgetary transfers	Migration
	Employment forecasts	Dependency rate

- Municipality changes
- Different statistical methods
- Definition of sector
- Are the indicators appropriate?



# Data overview



# Methodological issues

## ■ Normalisation

- Within countries/across region
- Normalised values adjusted according to actual degree of adaptive capacity (e.g. high level of employment in the sector = lower adaptive capacity, high level of migration = higher adaptive cap.)
- Currencies
- Municipal income differences
- How much do we lose?
- Issues of weighting – hopefully solved by web-tool

## ■ Nordic harmonisation – is it possible?

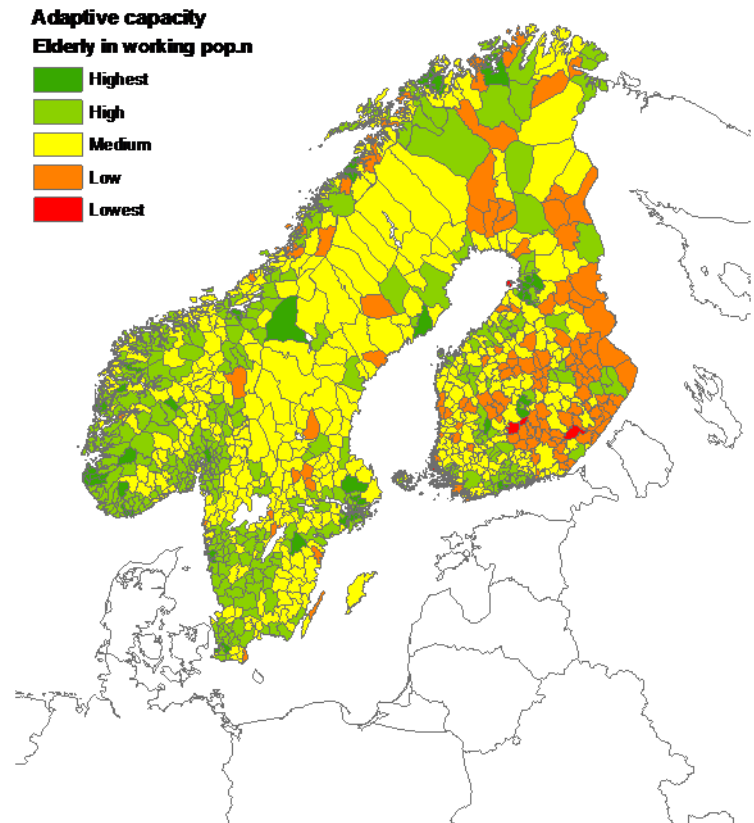
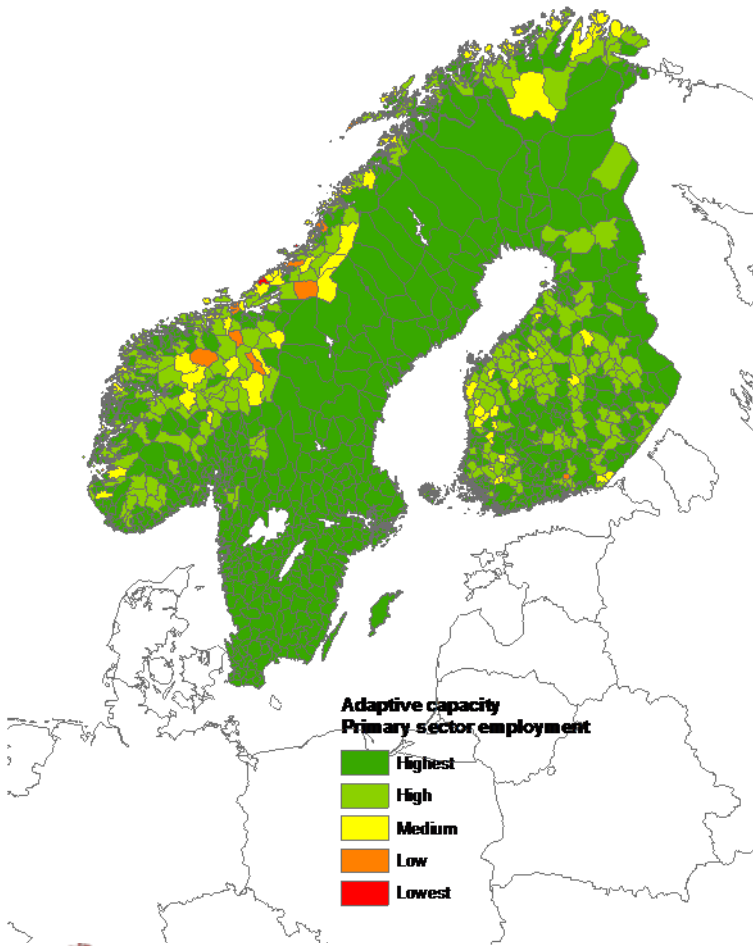


# Nordic harmonisation

- Original study from Norway
- Basis for a common approach to map vulnerability
- Scope for common approaches to adaptation?
- Data availability
- Data format
- Policy and category differences
  - What affects agriculture?
  - CC, policy, culture?



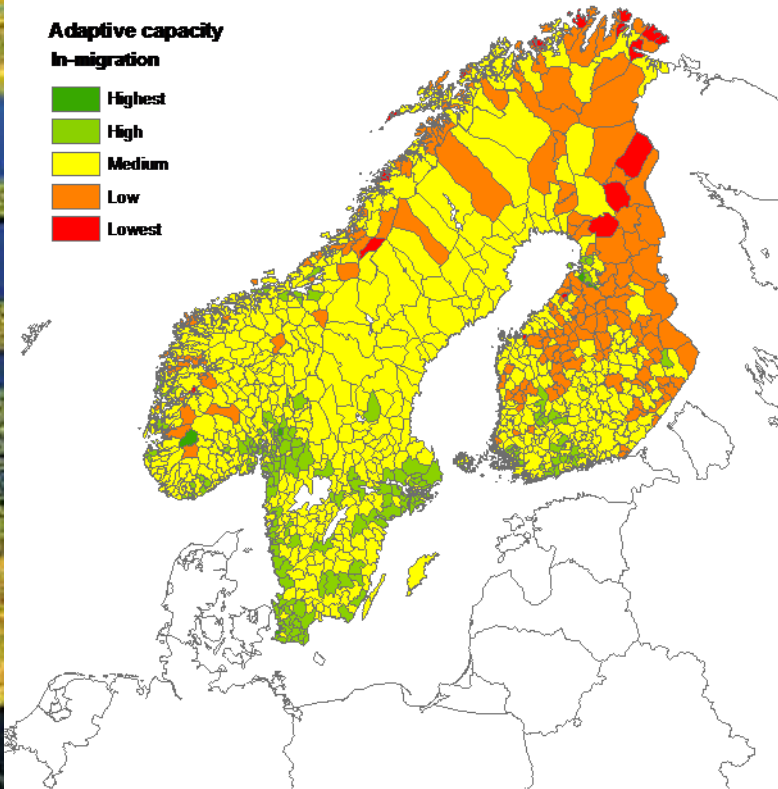
# Preliminary results



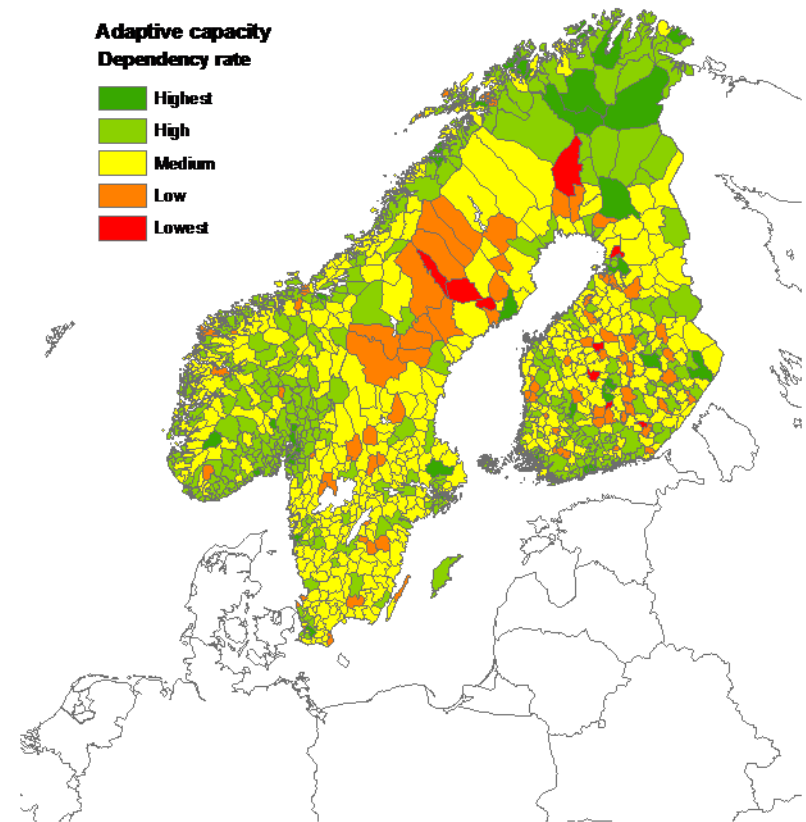
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# Preliminary results

## Adaptive capacity In-migration



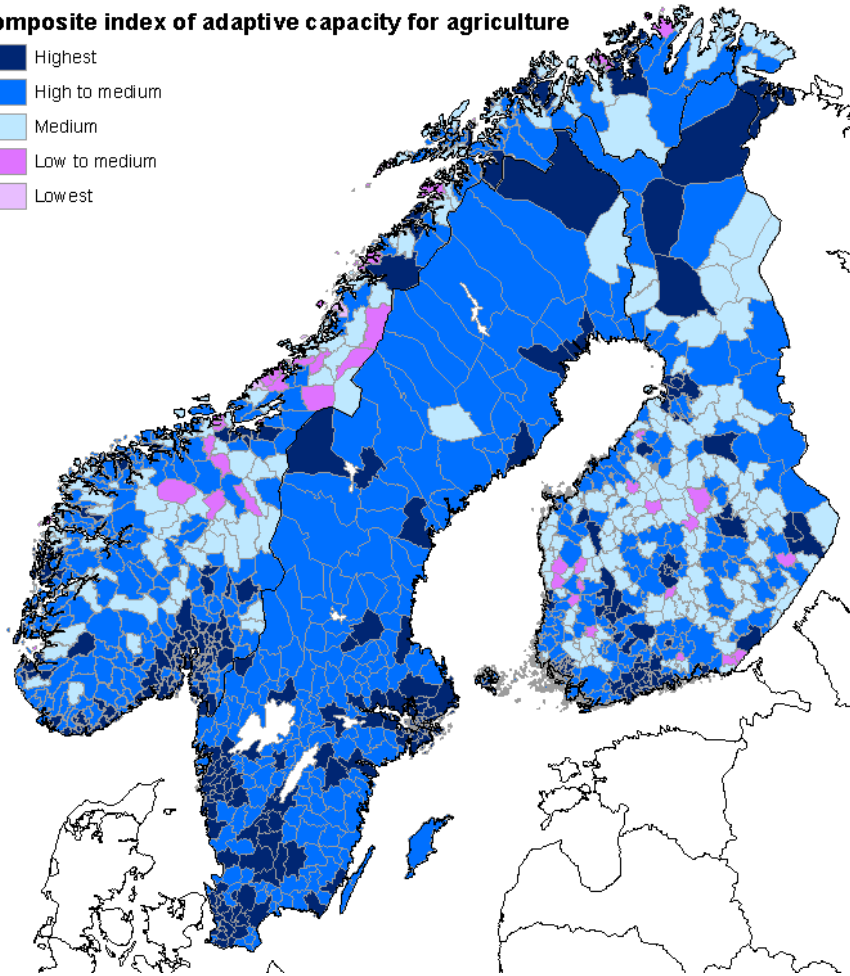
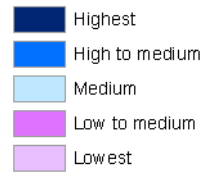
## Adaptive capacity Dependency rate



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# Preliminary results

Composite index of adaptive capacity for agriculture







# Extension

- Forecast population change by municipality or region
- Changing employment opportunities (pensions forecast, educational needs forecast, short-term employment forecasts)



**THANK YOU**







# Employment forecasts

- Available from TEM – Ministry of Economy and Employment – on a short-term basis (up to 2010) nationwide and by region
- Available from OM – Ministry of Education – on a longer term basis (up to 2020) nationwide and by region
- Municipality level forecasts possibly available through municipal administrations, but not collated
- What time-frame?
- How specific?



# Age distribution

- Good data
- 1980 -2008 (preliminary data)
  - By municipality
  - Age distribution
  - Sex ratio
- Forecast 2006 – 2040
  - By municipality
  - Age distribution
  - Sex ratio

**Taulukko 3.** Suuralueiden osuus (%) toimialojen työllisistä vuonna 2004 ja ennakoitu osuus (%) vuonna 2020

Toimialat	Työllisten määrä yhteensä				Suuralueiden osuus (%) työllisistä vuosina 2004 ja 2020							
	2004		2020		Etelä-Suomi		Länsi-Suomi		Itä-Suomi		Pohjois-Suomi	
	lkm	%	lkm	%	2004	2020	2004	2020	2004	2020	2004	2020
1 Maa-, riista- ja kalatalous	79 870	100	57 400	100	29	30	34	34	19	18	19	17
2 Metsätalous ja -teollisuus	76 000	100	73 100	100	36	34	32	32	16	18	16	16
3 Elintarvikkeiden, juomien ja tupakan valmistus	38 060	100	37 700	100	50	48	32	32	9	9	9	10
4 Metallien ja metallituotteiden valmistus	61 080	100	60 300	100	37	37	33	30	10	11	20	22
5 Kemiallisten yms. tuotteiden valmistus	36 700	100	35 600	100	56	54	32	32	6	7	6	7
6 Koneiden ja laitteiden sekä kulkuneuvojen valmistus	77 830	100	82 800	100	47	45	39	38	8	8	6	9
7 Elektroniikka- ja sähkötuotteiden valmistus	63 410	100	71 300	100	55	49	21	29	5	5	18	18
8 Muu teollisuus	46 490	100	48 900	100	46	44	32	33	12	12	10	11
9 Sähkö, kaasua ja vesihuolto	15 340	100	15 600	100	47	46	28	26	10	10	15	18
10 Rakentaminen	135 990	100	153 700	100	54	55	24	24	9	9	13	12
11 Tukkukauppa ja agentuuritoiminta	94 180	100	104 400	100	77	78	15	13	4	4	5	5
12 Vähittäiskauppa	160 120	100	175 000	100	52	54	25	23	10	10	13	14
13 Matkailu-, majoitus- ja ravitsemistoiminta	73 700	100	97 500	100	57	57	21	20	9	8	13	15