Federal Agency for Water Management
Institute for Land and Water Management Research

Soil erosion in Austria, control measures and implementation strategies

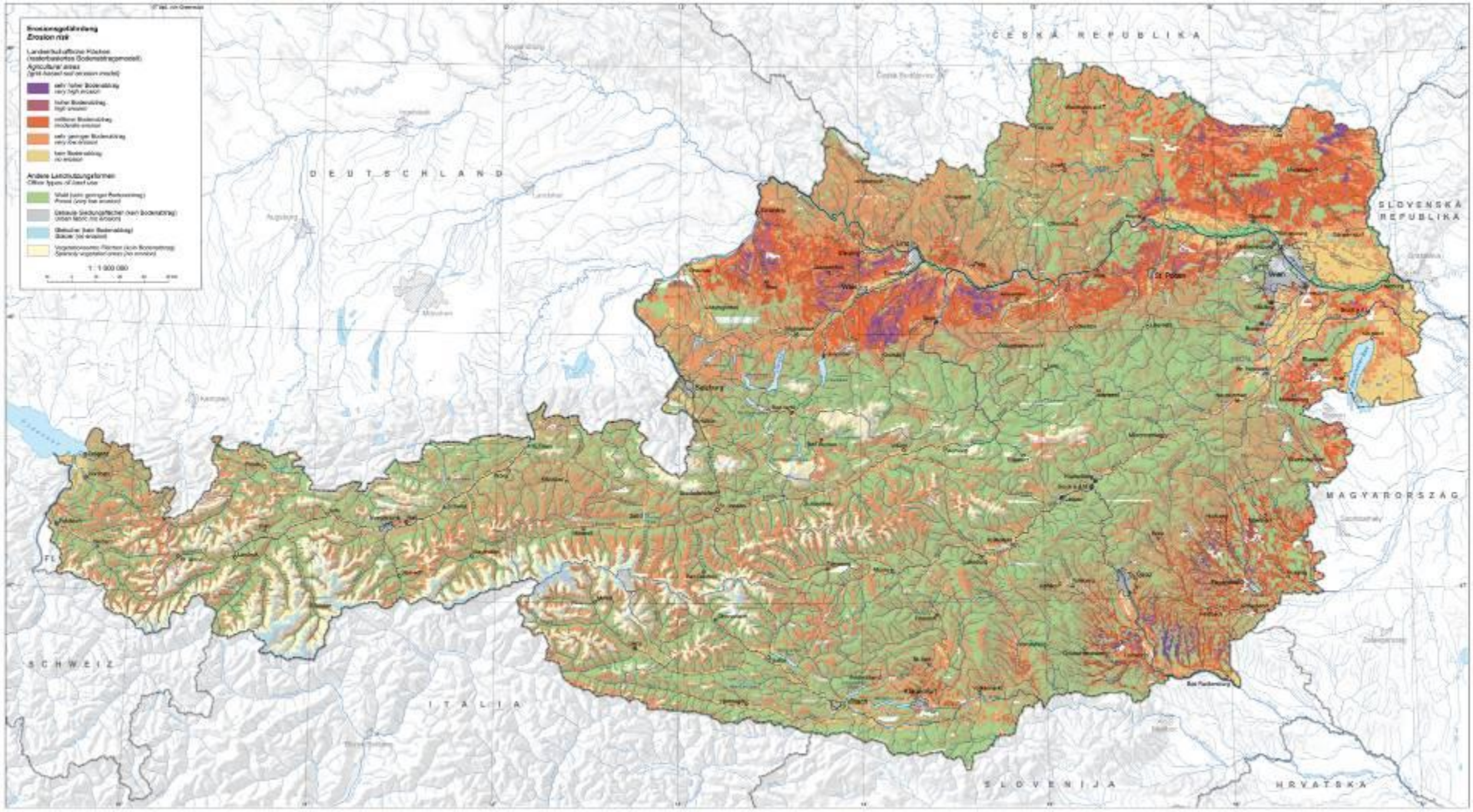
P. Strauss

Erosion is there an onsite problem?

Erosion is there an offsite problem?

Erosion

Large scale modelling



Strauss (2007)

EROSION

CONTROL MEASURES AND IMPLEMENTATION STRATEGIES

ÖPUL

Austrian programme for an environmentally sustainable agriculture

Set of measures to reduce negative impact of agricultural activities on environment

Participation voluntary

Start: 1995

Coverage: ~ 90% of agriculturally used area

Annual amount: ~ 1 billion €

Erosion control measures

ÖPUL

Direct measures

- Conservation tillage on arable land
- Terracing in orchards
- Terracing in vineyards
- Soil coverage in orchards during 10 months
- Soil coverage in vineyards during winter
- Undersown crops to maize

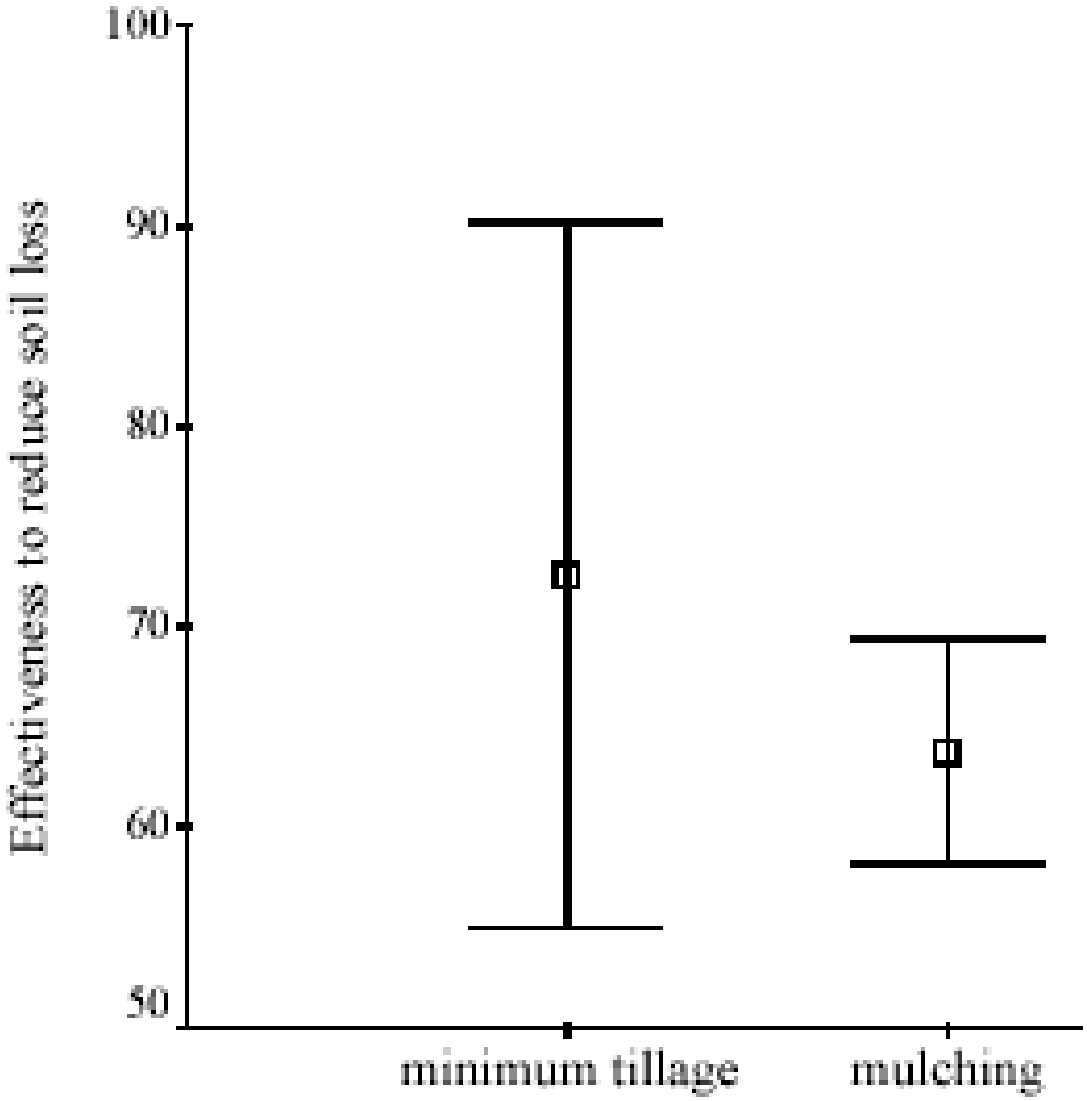
Indirect measures

- Buffer strips
- Organic farming
- Catch crops during winter

Conservation tillage

ÖPUL

Effectiveness of conservation tillage to reduce soil erosion – literature review for temperate climate



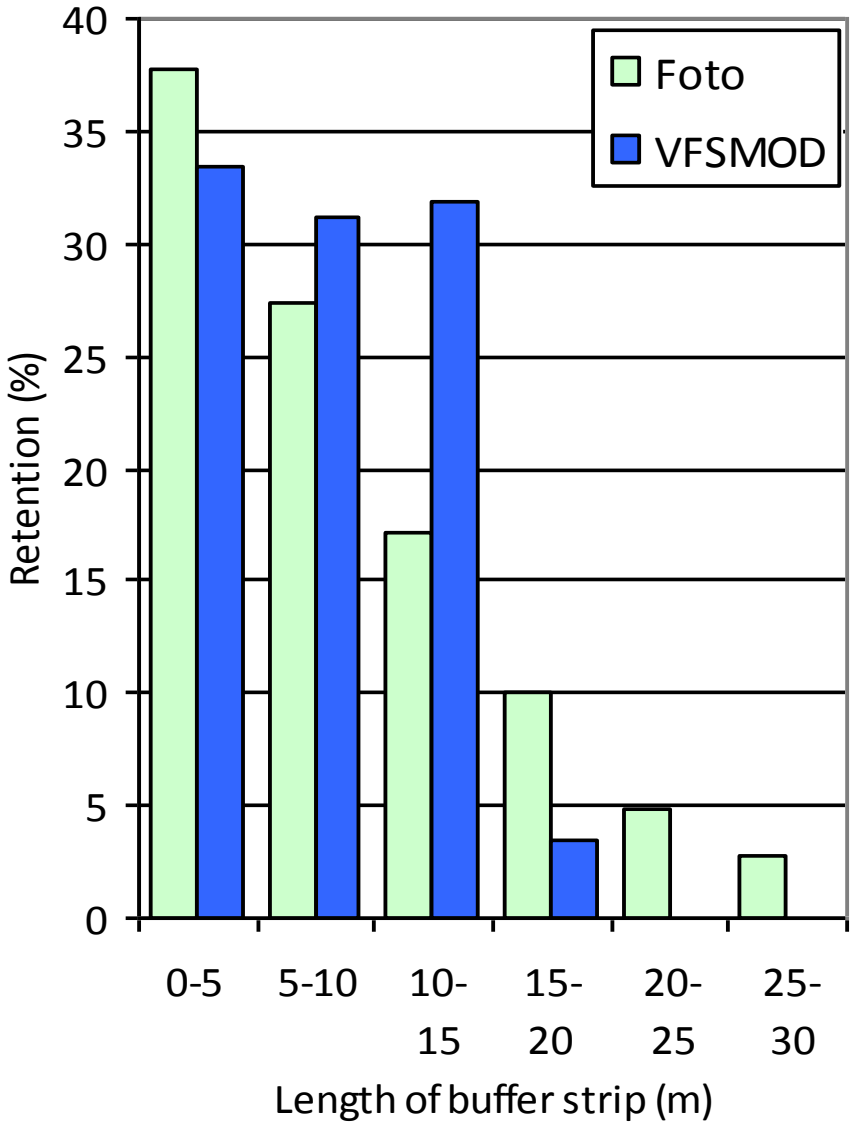
Strauss et al.(2002)

Buffer strips

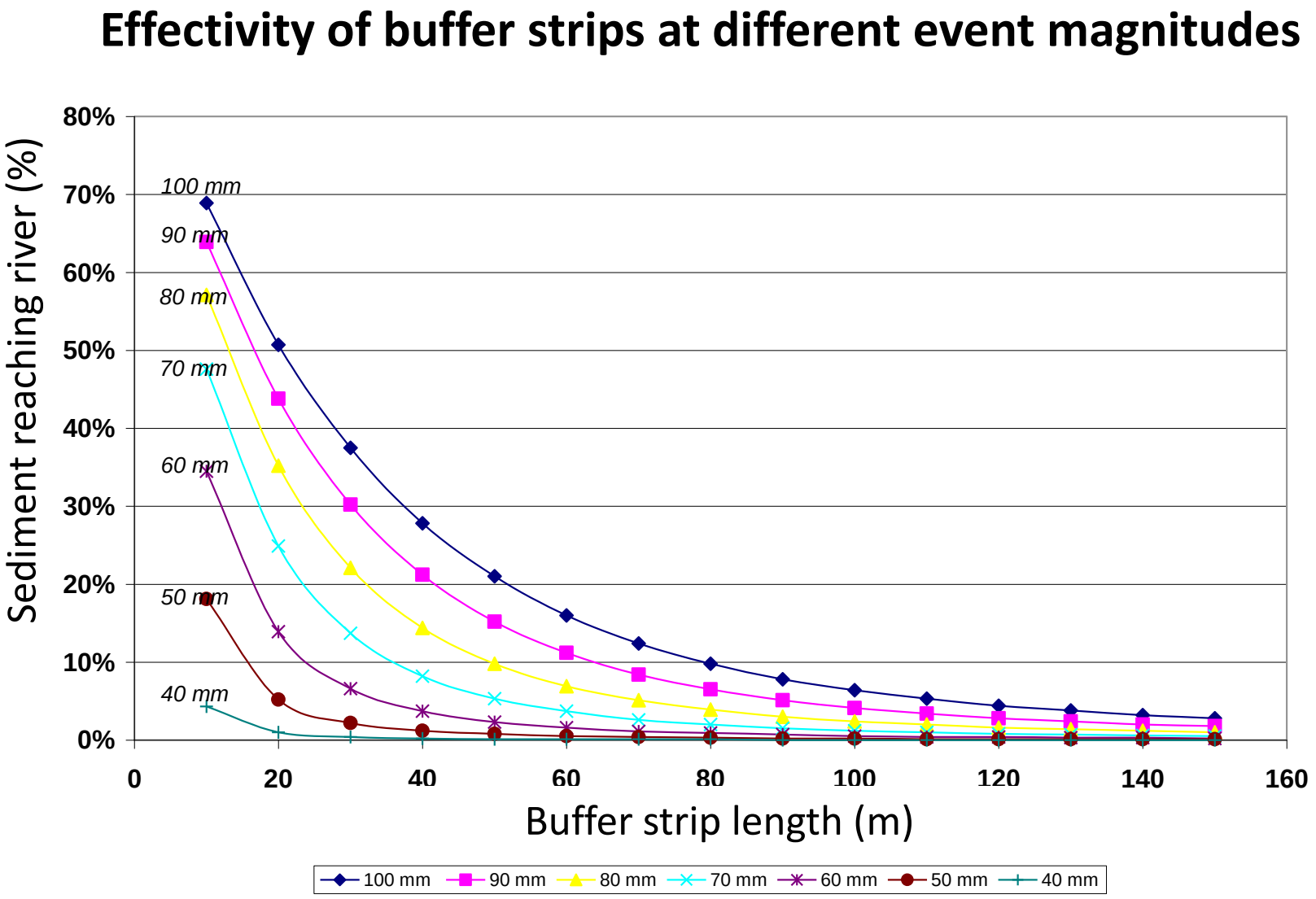
ÖPUL

Buffer strips

ÖPUL



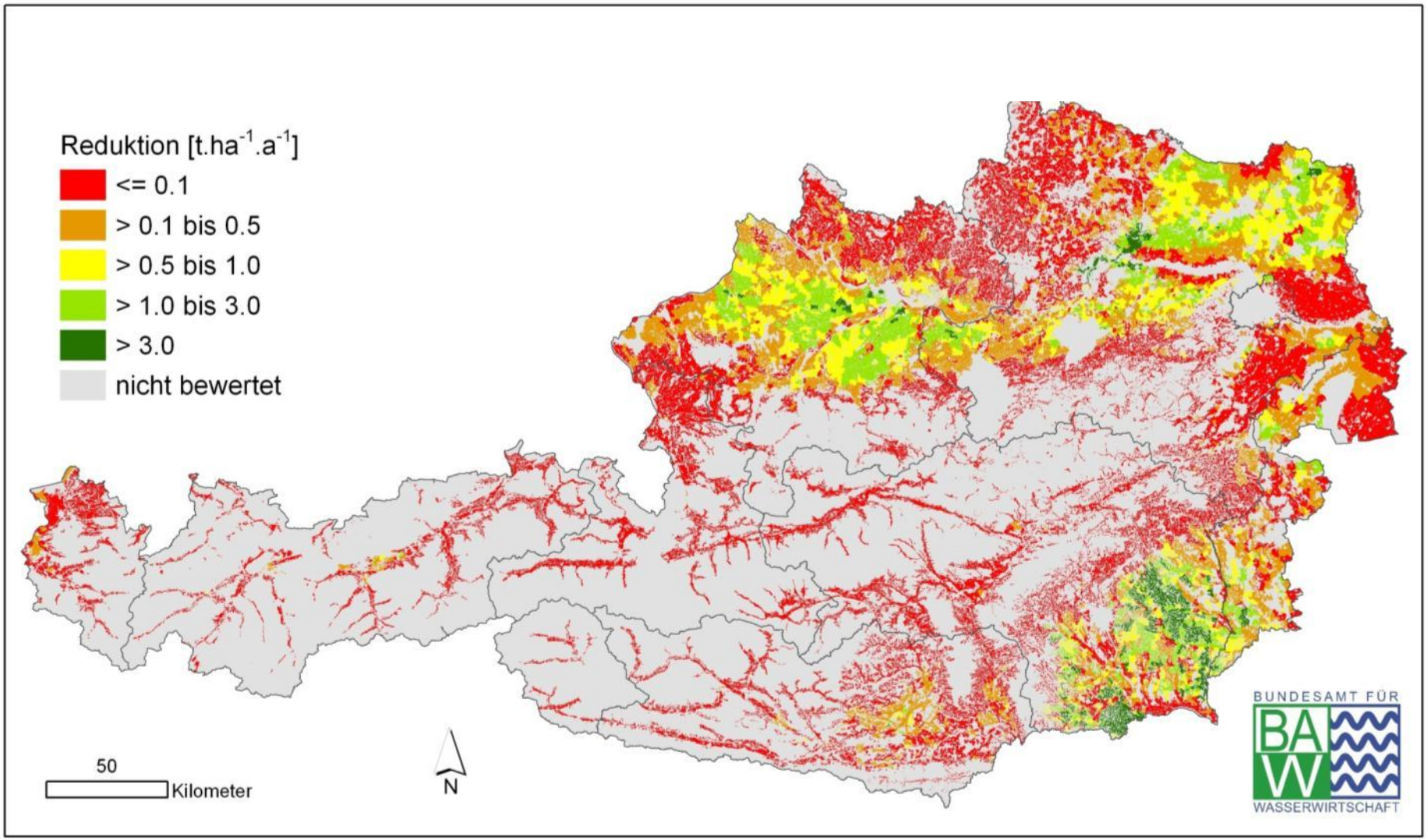
Strauss (unpubl)


Effectivity of buffer strips at different event magnitudes
Sediment reaching river (%)
80%
70%
60%
50%
40%
30%
20%
10%
0%
100 mm
90 mm
80 mm
70 mm
60 mm
50 mm
40 mm
0
20
40
60
80
100
120
140
160
Buffer strip length (m)
100 mm
90 mm
80 mm
70 mm
60 mm
50 mm
40 mm

Soil Loss 2009 (t/ha/a) ÖPUL

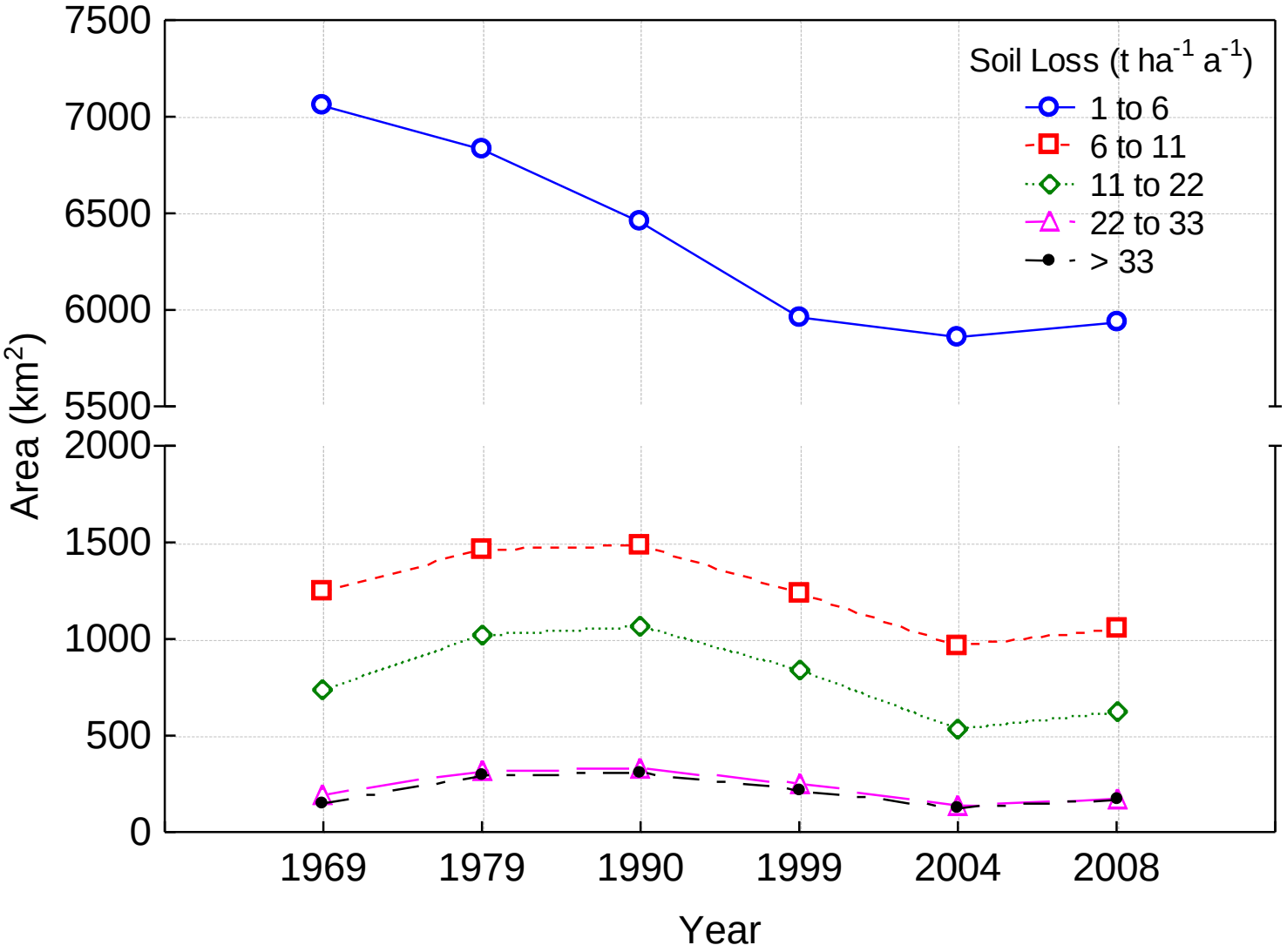
	BGLD	NÖ	OÖ	SBG	STMK	TIROL	VBG	WIEN	AUT
Soil Loss without ÖPUL	**2,9**	**3,8**	**6,0**	**1,8**	**5,6**	**1,2**	**3,4**	**2,6**	**3,8**
Reduction through measures in orchards and vinyards	**0,2**	**0,1**	**0,0**	**0,0**	**1,0**	**0,0**	**0,0**	**0,3**	**0,2**
Reduction through conservation tillage	**0,1**	**0,3**	**0,5**	**0,0**	**0,0**	**0,0**	**0,0**	**0,1**	**0,2**
Soil Loss with ÖPUL	**2,6**	**3,4**	**5,5**	**1,8**	**4,6**	**1,2**	**3,4**	**2,2**	**3,4**
Reduction by ÖPUL in %	**10%**	**11%**	**8%**	**0%**	**18%**	**1%**	**0%**	**13%**	**10%**

Reduction of erosion in 2009



Changes in soil loss over 40 years

Calculated soil loss for different groups of soil loss since 1969



Erosion control measures outside ÖPUL

Ploughing in autumn

Management across slope

Grassed water ways

„Wheat“ instead of „maize“

Strip cropping

Double seeding density

Twin tyres

Seeding of winter barley together with maize

…….

Erosion control measures strip cropping

EROSION

Tolerable Soil Loss

How much soil loss can we afford?

Frequency distribution of literature values for weathering and surface soil development

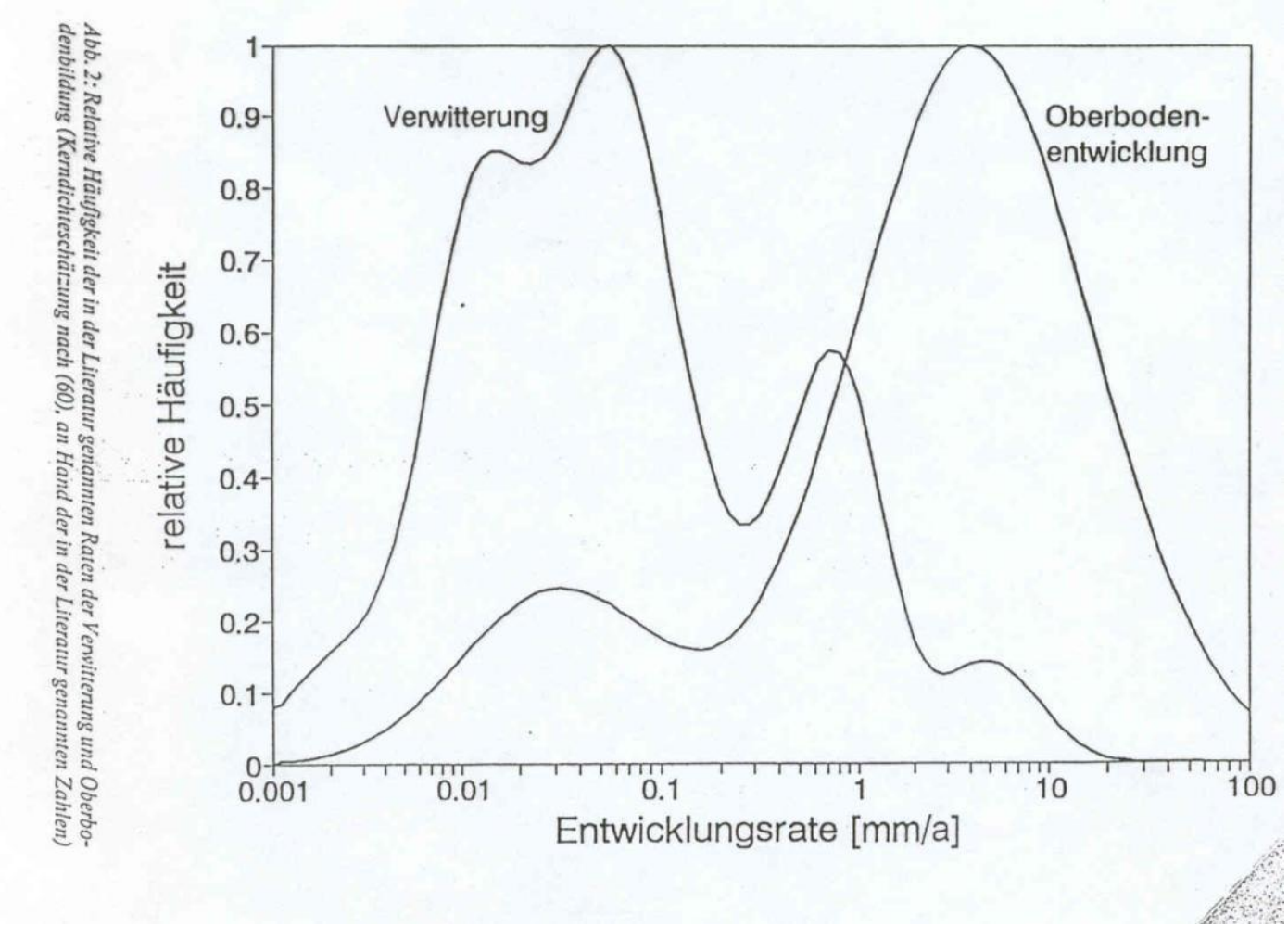


Abb. 2: Relative Häufigkeit der in der Literatur genannten Raten der Verwitterung und Oberbodenbildung (Kerndichteschätzung nach (60), an Hand der in der Literatur genannten Zahlen)

How much soil loss can we afford?

Guidelines of USDA for tolerable soil loss

Tab. 1: **Richtlinien des Soil Conservation Service zur Festlegung von Toleranzgrenzen für Böden mit unterschiedlichen Durchwurzelungstiefen (76)**

Durchwurzelungstiefe cm	tolerierbarer Bodenabtrag (t/[ha*a]) regenerierbarer Boden*	nicht regenerierbarer Boden**
0– 25	2,2	2,2
25– 51	4,5	2,2
51–102	6,7	4,5
102–152	9,0	6,7
>152	11,2	11,2

* Böden über günstigem Ausgangsmaterial, die durch Bodenbearbeitung, Düngung, Zufuhr an organischer Substanz und andere Bewirtschaftungsmaßnahmen regeneriert werden können.

** Böden über ungünstigem Ausgangsmaterial wie Festgestein, die wirtschaftlich nicht regenerierbar sind.

Switzerland „Verordnung über die Belastung des Bodens 1998“

< 70 cm rootable soil depth 2 t/ha/a

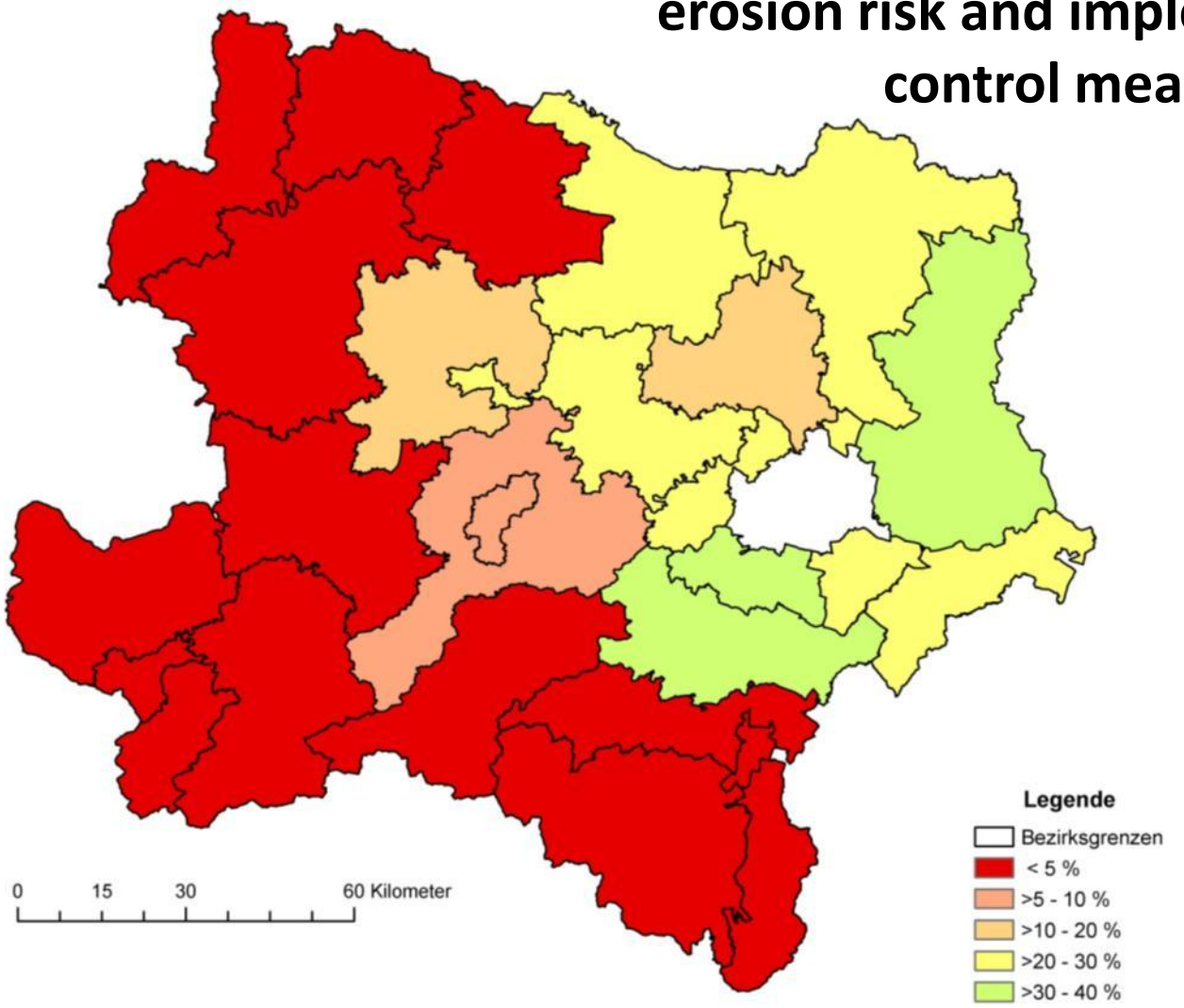
> 70 cm rootable soil depth 4 t/ha/a

Open questions

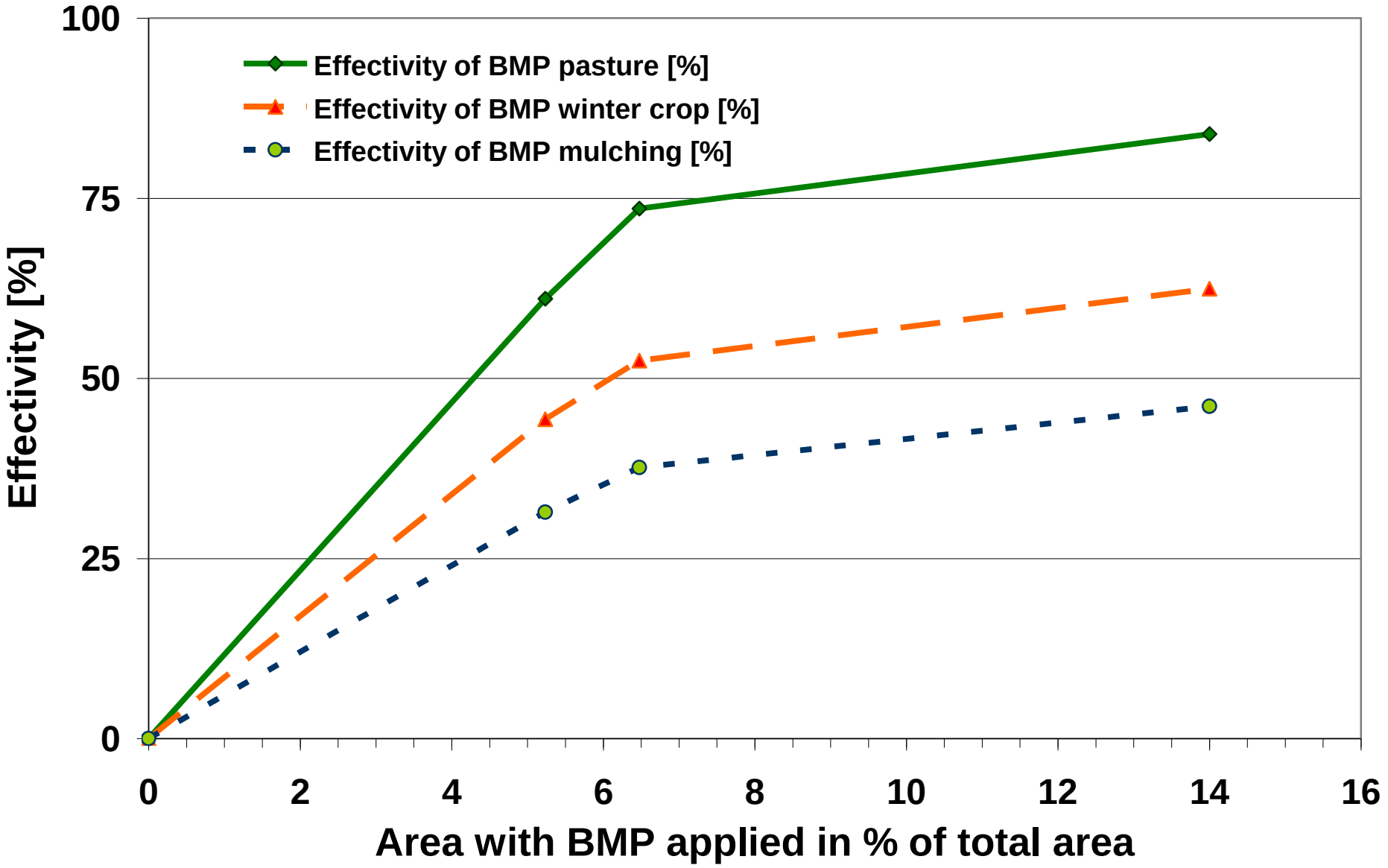
- How can we obtain a better participation of farmers to erosion control measures?
- How can we obtain a better localisation of the available money?
- Are there counter effects of erosion control measures and how can we evaluate them?
- How much soil loss can we afford?

Localisation of money

Relationship between extent of areas with erosion risk and implementation of erosion control measures in 2006



Localisation of money



Strauss et al., 2007

Thank you for your attention!