Assessment of benefits and costs of Sustainable Land Management (SLM)

Contributions from the WOCAT Knowledge Management System

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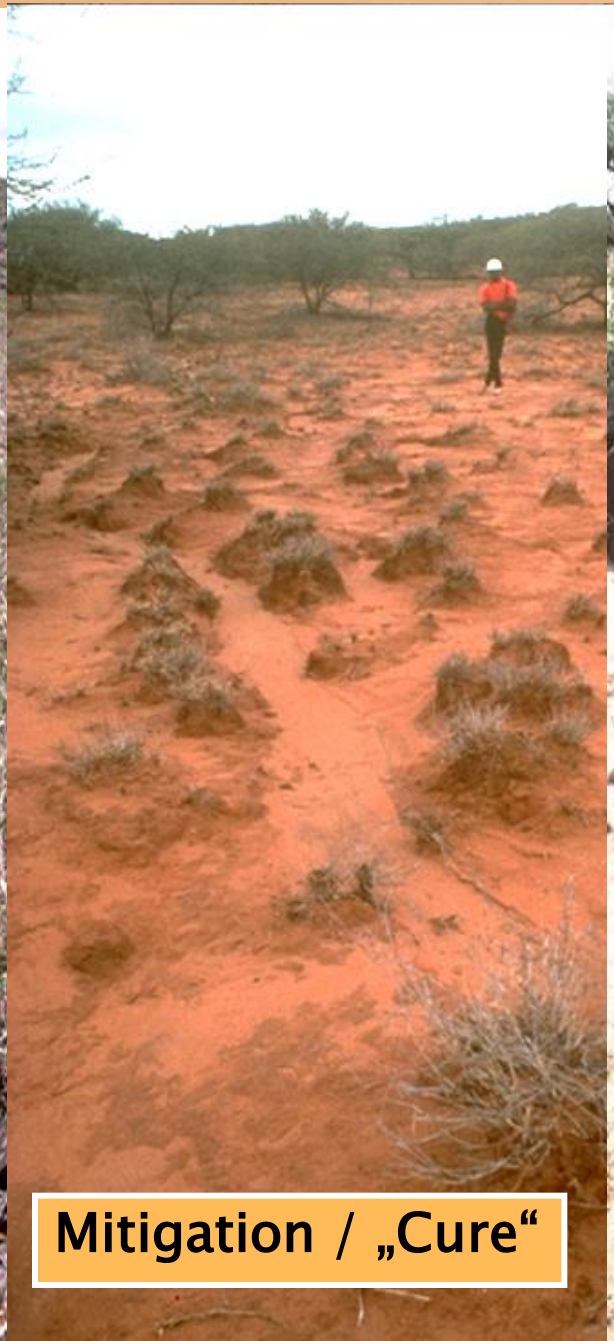
Decision support: When/where to intervene?



Documenting SLM knowledge

Questio
technol

Docur
and w

WOCAT Technologies QT 16 Specification

2.4.3.2 Establishment

Initial establishment

activity (in sequence)

1 ...Digging ...h

2 ...Cutting /di

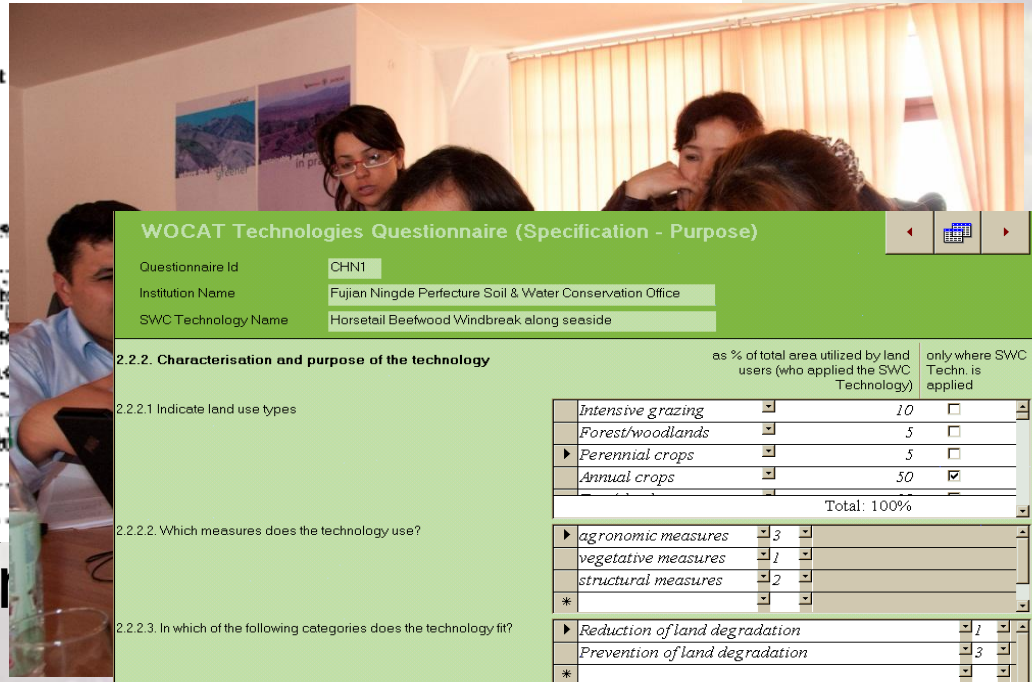
...planting ...m

3 ...Transporting

4 ...Transplanti

5 .....

Enteri



Ent

WOCAT Technologies Questionnaire (Specification - Purpose)

Questionnaire Id	CHN1
Institution Name	Fujian Ningde Perfecture Soil & Water Conservation Office
SWC Technology Name	Horsetail Beefwood Windbreak along seaside

2.2.2. Characterisation and purpose of the technology

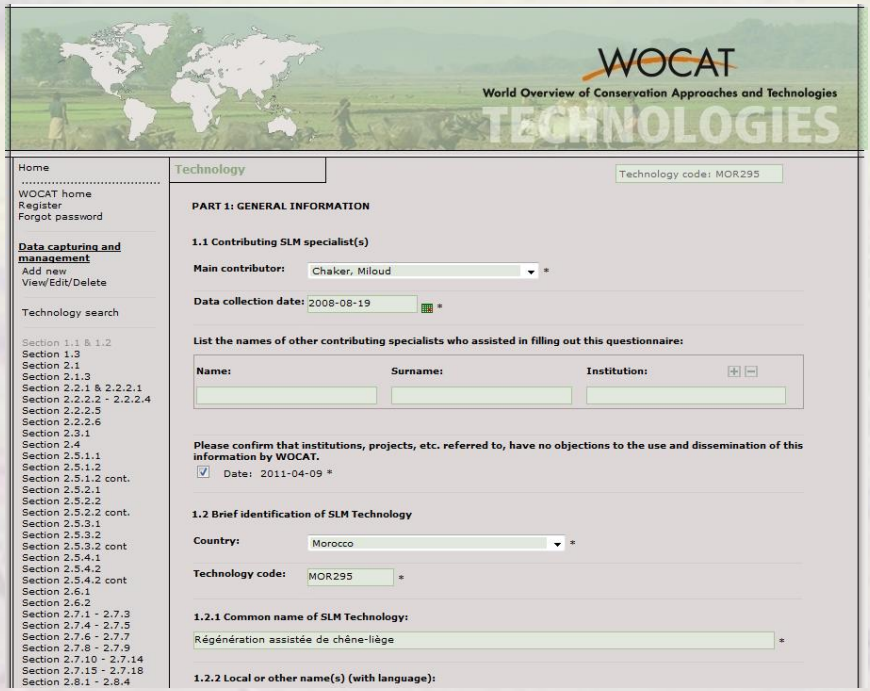
	as % of total area utilized by land users (who applied the SWC Technology)	only where SWC Techn. is applied
2.2.2.1 Indicate land use types		
Intensive grazing	10	☐
Forest/woodlands	5	☐
Perennial crops	5	☐
Annual crops	50	☑
Total: 100%		
2.2.2.2. Which measures does the technology use?		
agronomic measures	3	
vegetative measures	1	
structural measures	2	
2.2.2.3. In which of the following categories does the technology fit?		
Reduction of land degradation	1	
Prevention of land degradation	3	
2.2.2.4 Which categories of soil degradation are mainly addressed by the technology?		
Soil erosion by water	2	
Wind erosion	1	
Soil fertility problem	2	
2.2.2.5 What are the main means by which the technology achieves its observed impact?		
Control of raindrop splash	2	
Control of concentrated runoff (retain/trap)	3	

Computer data entry form

Global knowledge base

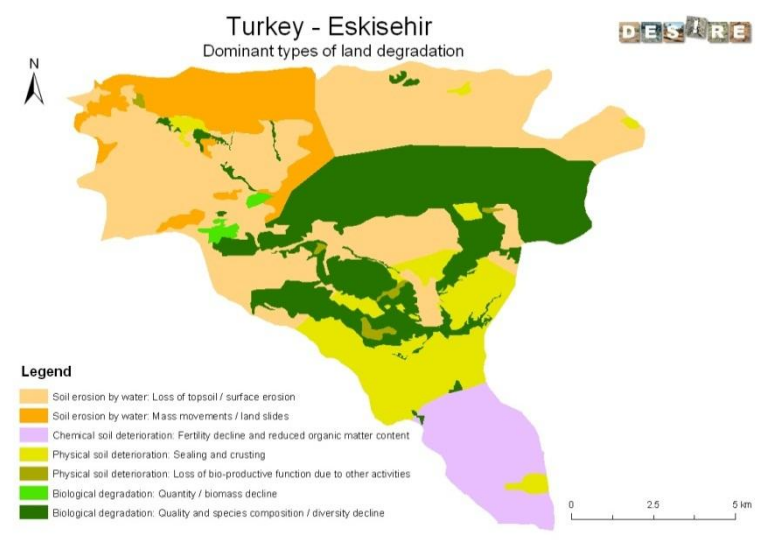
- 310 SLM technologies 170 approaches from 50 countries
- degradation and SLM maps from 20 countries
- **Data search and query system … for analysis, reporting**

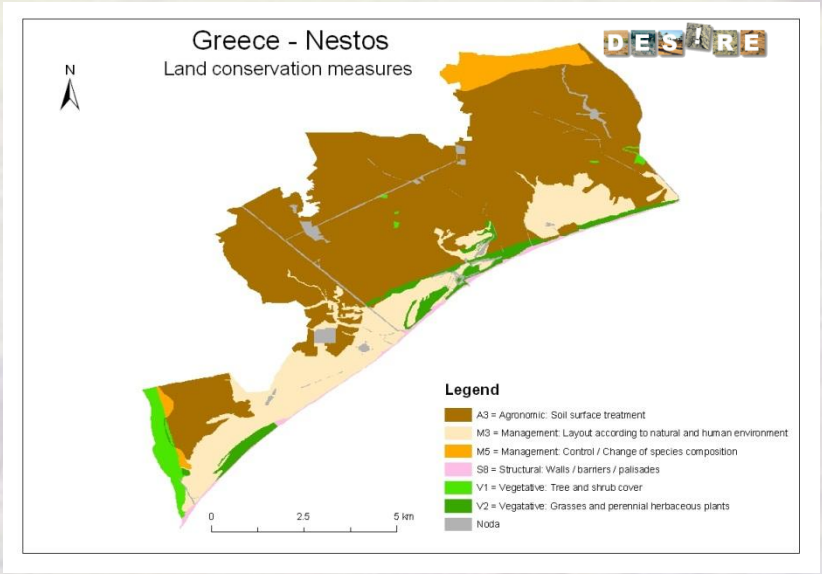
All online, open source, in different languages



Gobal spread of SLM

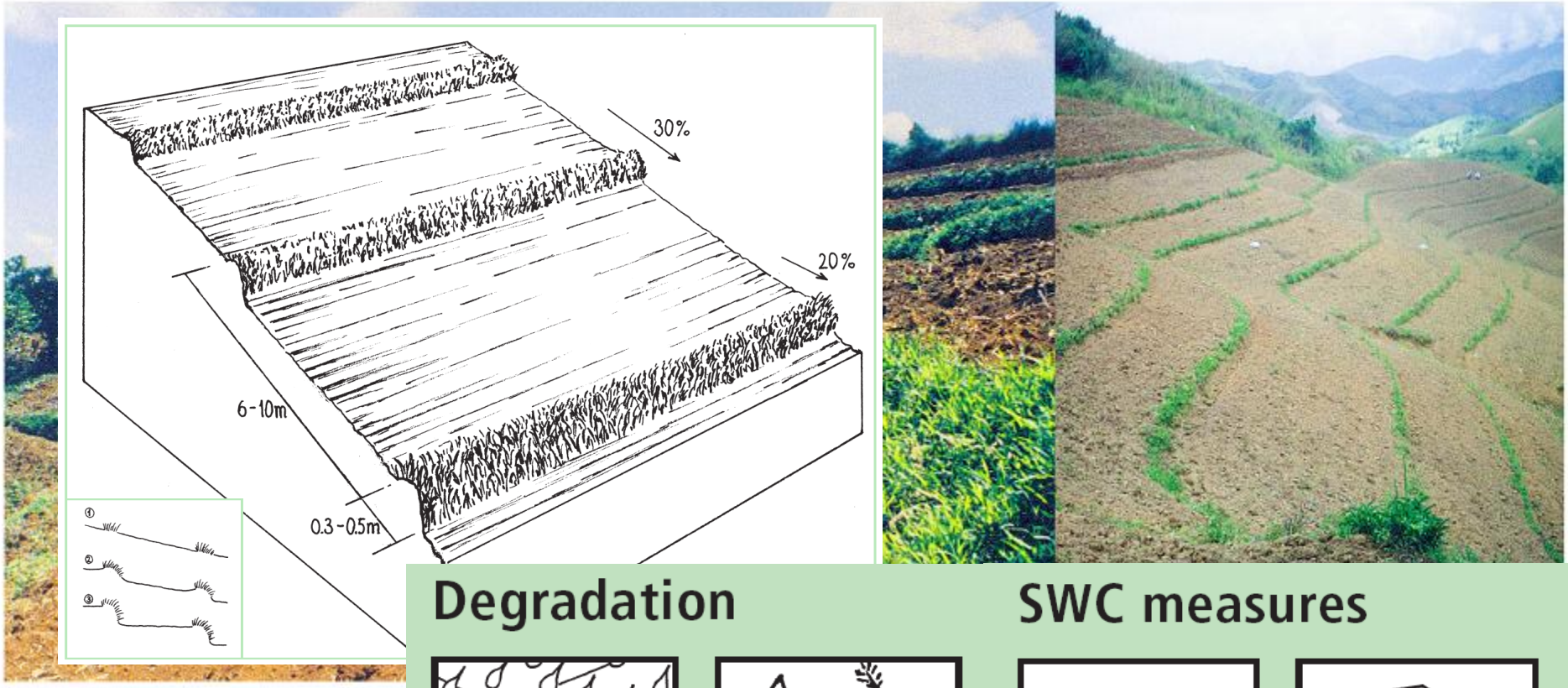
- National and regional maps of degradation and conservation





Costs and Benefits of SLM Technologies

WOCAT



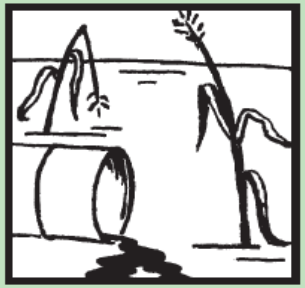
Natural vegeta

Philippines

Within individual cropland
contour and left unplough
barriers of naturally establis

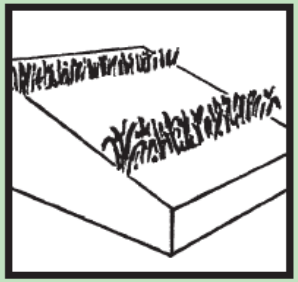
Degradation

water erosion: loss of topsoil, gully

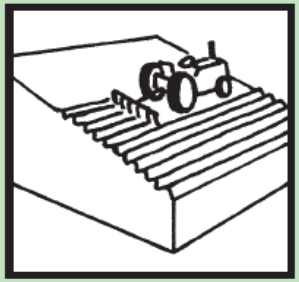


chemical: fertility decline

SWC measures



vegetative: narrow grass barriers



agronomic: contour plough, mulching (supp.)

… economics

Establishment inputs and costs per ha

Inputs	Costs (US$)	% met by land user
Labour (5 person days)	15	100%
Equipment		
- Animal traction (32 hours)	40	100%
- Tools (2): Plough and harrow	25	100%
- Stakes (pegs)	4	100%
TOTAL	**84**	**100%**

Benefits compared with costs	short-term:	long-term:
establishment	positive	very positive
maintenance/recurrent	positive	very positive

Impacts (on- / offsite)

Production and socio-economic benefits

+	+	+	fodder production/quality increase (or biomass as mulch)
+	+	+	very low inputs required
+	+		farm income increase
+			crop yield increase

Socio-cultural benefits

+	+	+	improved knowledge SWC/erosion
+	+		community institution strengthening
+	+		national institution strengthening (government line agencies and educational institutions)

Ecological benefits

+	+	+	soil cover improvement
+	+	+	soil loss reduction
+	+	+	soil structure improvement
+			increase in soil moisture
+			increase in soil fertility
+			biodiversity enhancement

Off-site benefits

Table 3: A comparison of inputs involved in terrace establishment and maintenance

Technology	Country	Slope	Rainfed/ irrigated	Establishment			Maintenance		
				Person-days/ha	Total costs/ha US $	% met by land users	Person-days/ ha/year	Total costs/ha/ year US $	% met by land users
Orchard terraces with bahia grass cover	China	16–30%	Rainfed	350	1,840	70	60	376	100
Loess plateau terraces	China	16–30%	Rainfed	600	1,200	95	12	25	95
Fanya juu terraces	Kenya	5–8%	Rainfed	90	320	100	10	38	100
Rainfed paddy rice terraces	Philipp.	30–60%	Rainfed	800	2,700	100	10	40	100
Traditional stone wall terraces	Syria	16–30%	Rainfed	375	1,270	100	50	160	100
Small level bench terraces	Thailand	8–16%	Rainfed	125	275	100	20	45	100
Stone wall bench terraces	S. Africa	16–30%	Rainfed	420	1,460	100	5	20	100
Traditional irrigated rice terraces[1]	Nepal	30–60%	Irrigated	unknown	unknown	100	125	840	100
Rehabilitation of ancient terraces[2]	Peru	30–60%	Irrigated	130	1,400	35	6	126	100

[1] no information on labour input in contraction of these ancient terraces

[2] refers to rehabilitation of ancient systems, not original establishment

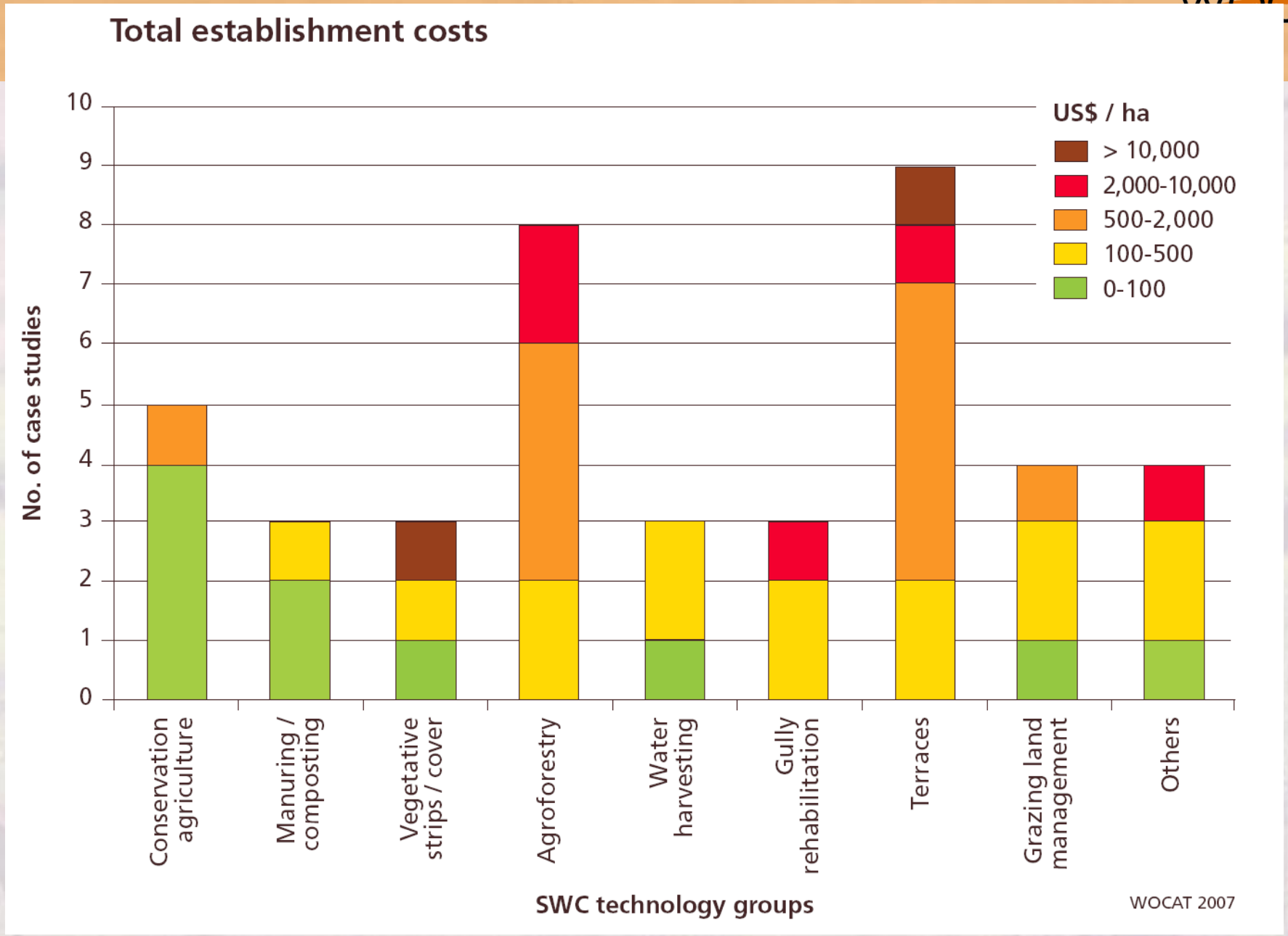


Figure 10 (left part): Establishment costs in relation to the SWC technology groups

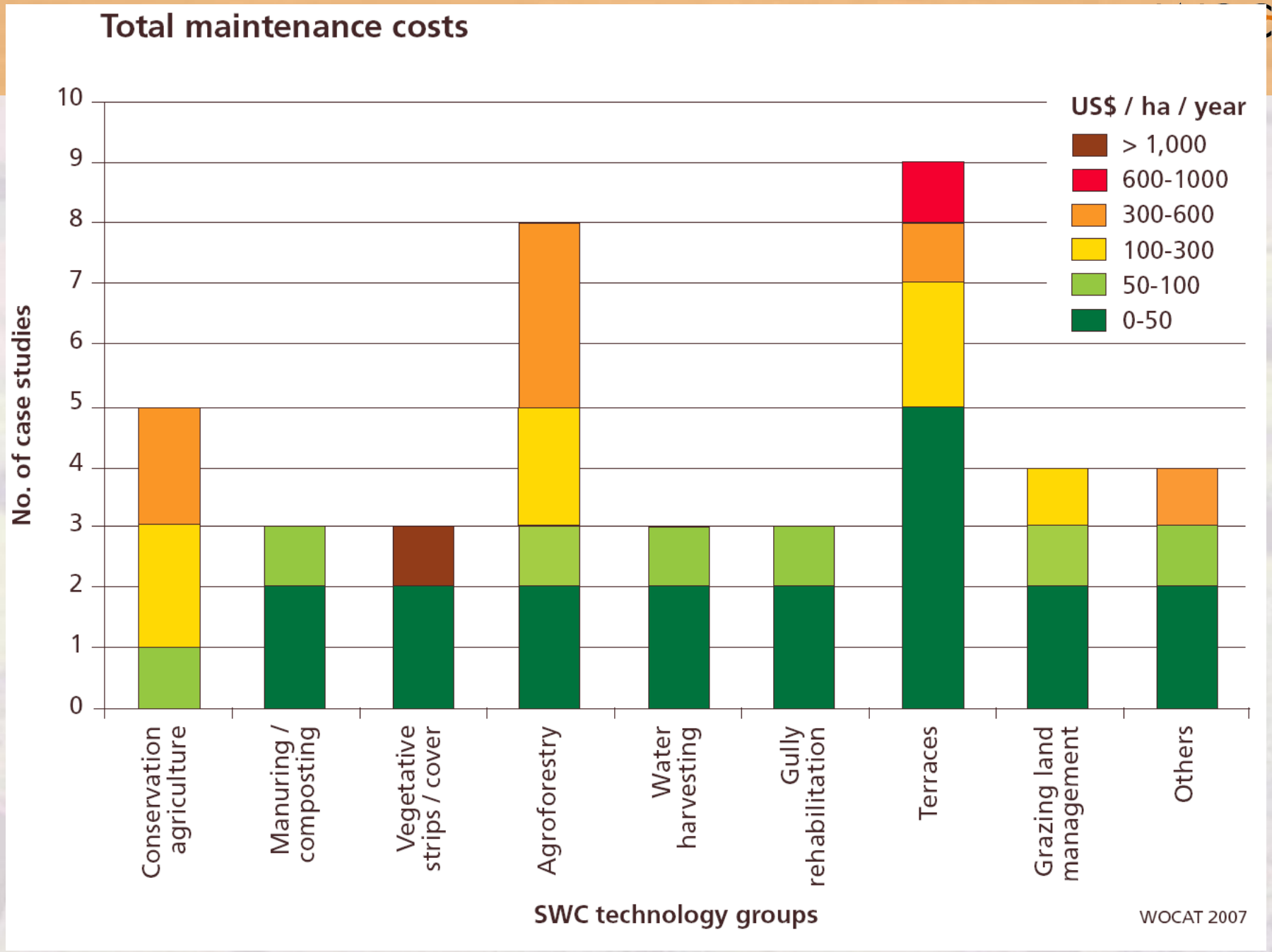


Figure 10 (right part): Maintenance costs in relation to the SWC technology groups

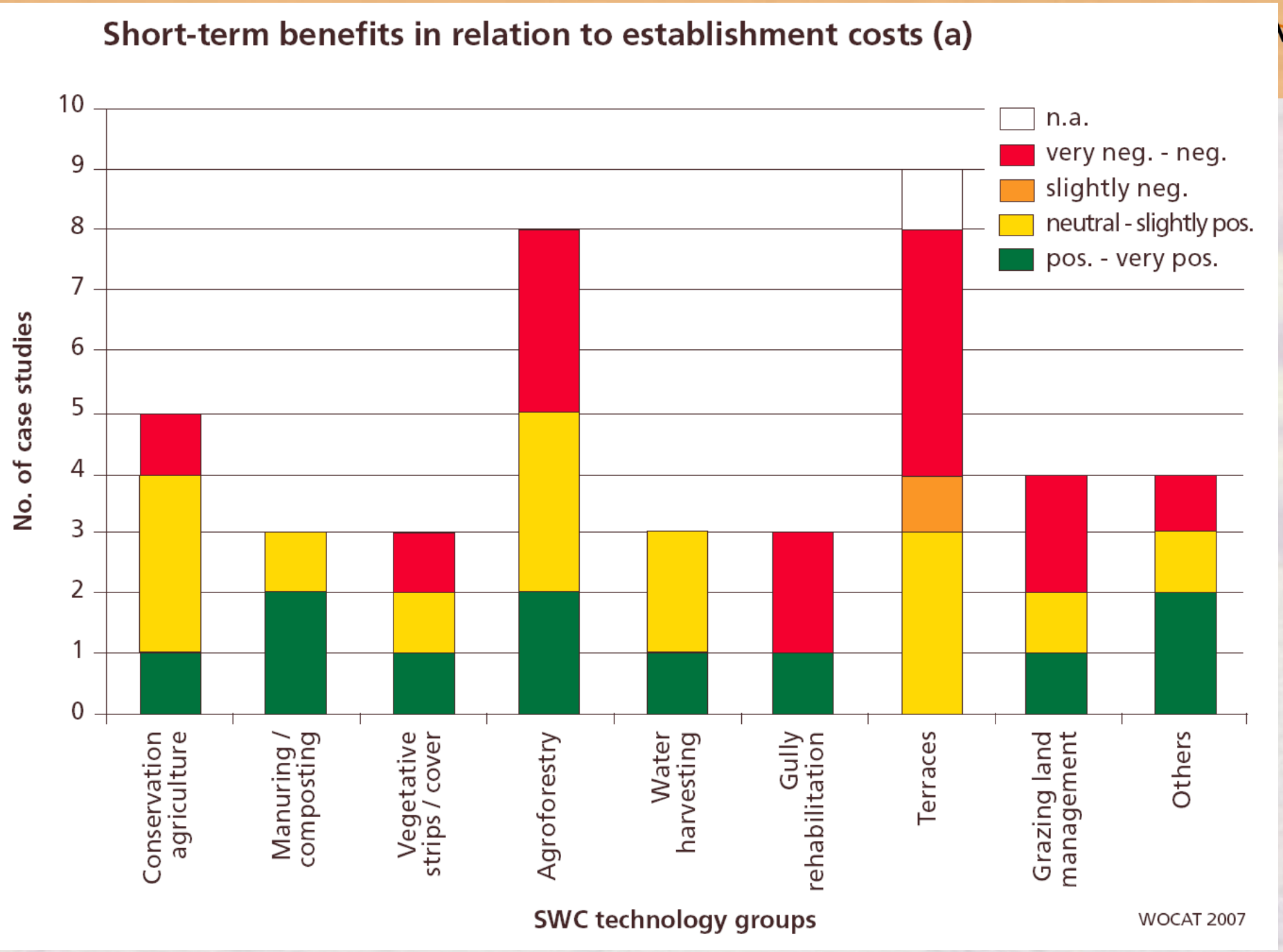


Figure 11 (a) : Perceived benefits of SWC technologies: short-term benefits in relation to establishment costs

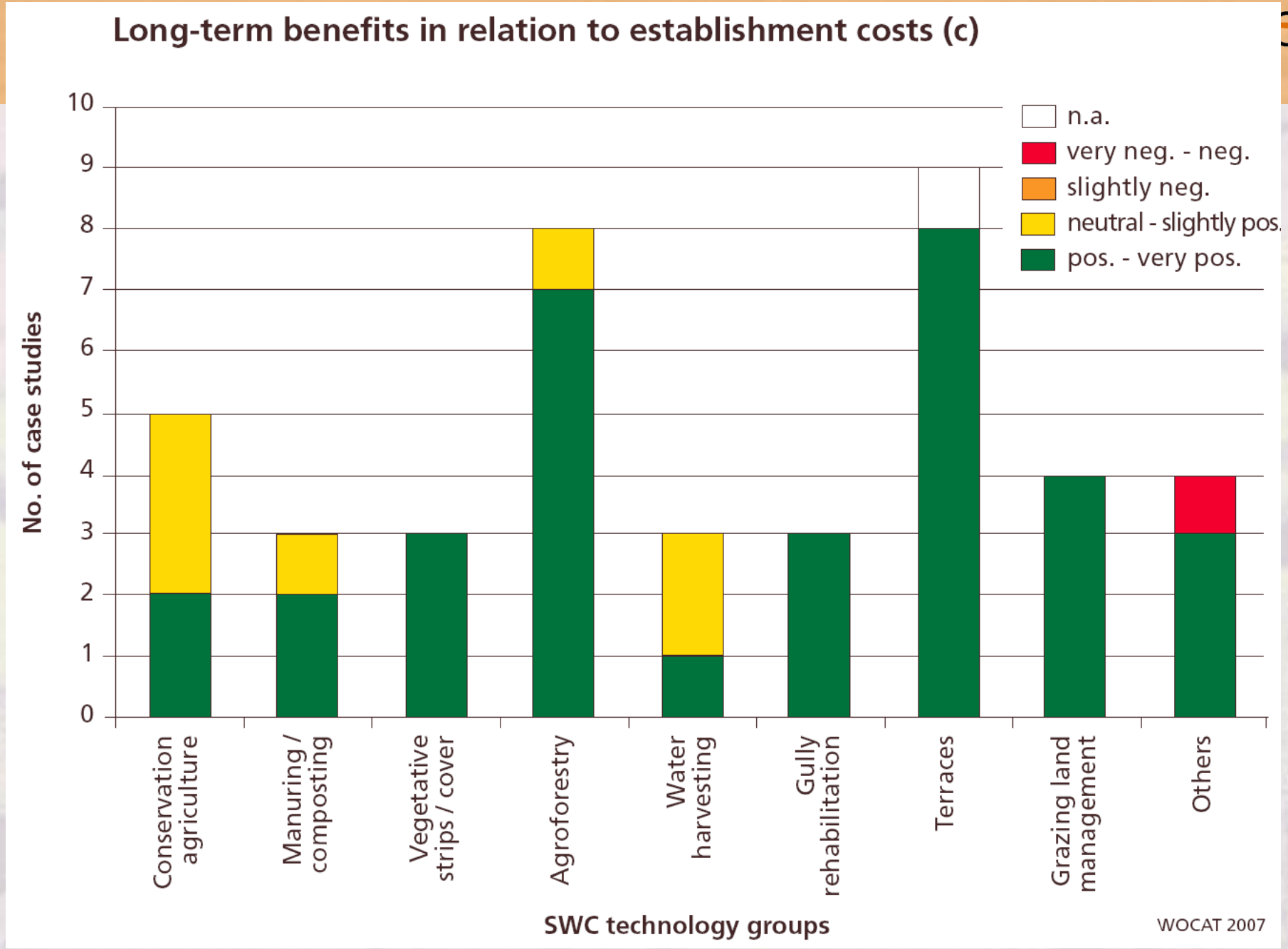


Figure 11 (c): Perceived benefits of SWC technologies: long-term benefits in relation to establishment costs

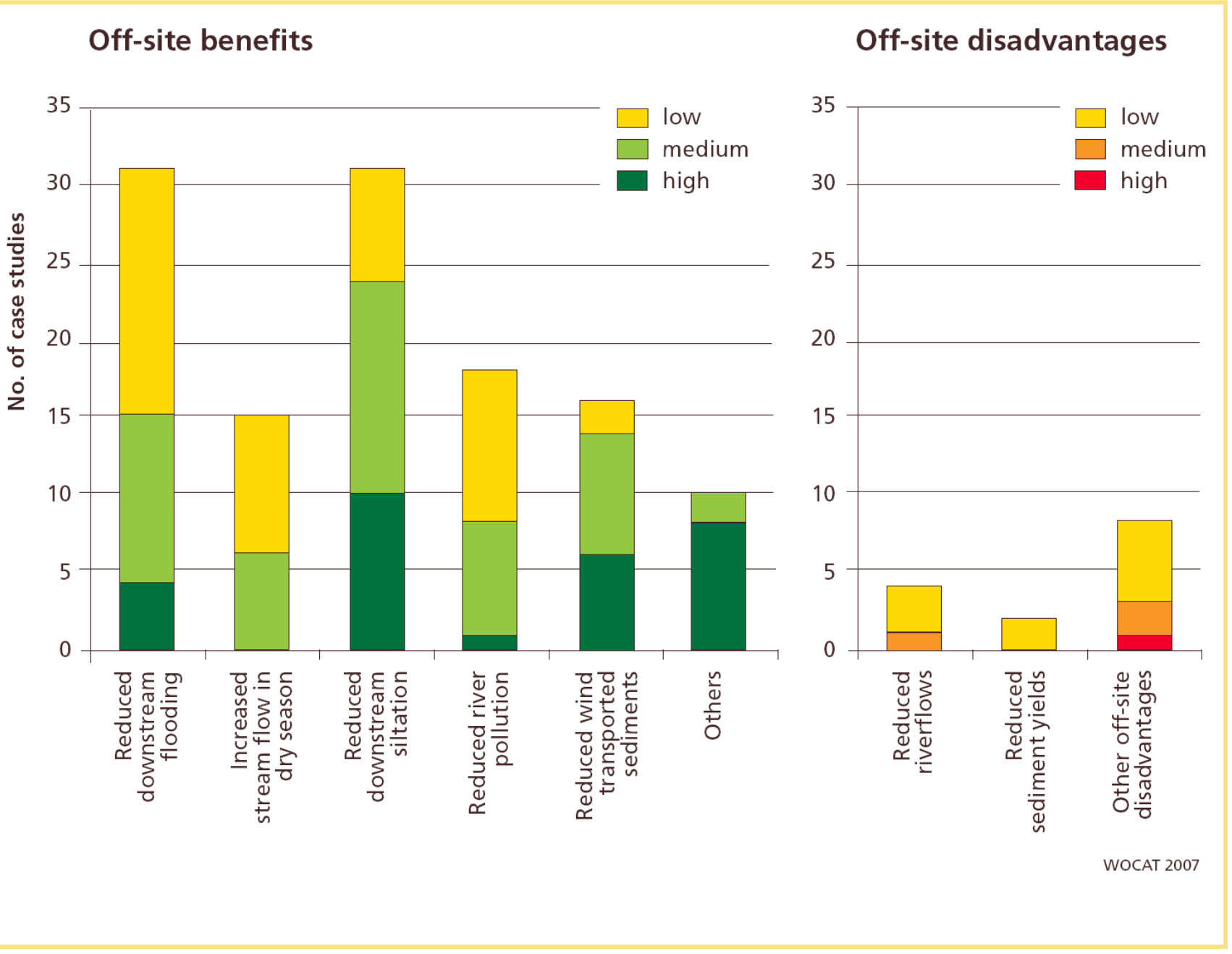


Figure 20: Perceived off-site (generally 'downstream') advantages/ benefits and disadvantages of the technologies described in the case studies.

Challenges

- Economic impacts of SLM measures are often context specific
- Benefits and costs of SLM are often not recognized and understood (land users, technicians, scientists…)
- Very often only qualitative assessments are done/available
- Monetarization of bio-phyiscal and social impacts needs sophisticated methods

WOCAT's contribution:

- WOCAT provides methods for standardized, rigorous and holistic assessment
- WOCAT database can be used as a reference
- Description of SLM technologies with WOCAT methods can provide a solid basis for more sophisticated economic valuation methods
- Economic methods can be integrated in WOCAT's decision support tools