Where people and their land are safer

A compendium of DRR-practices

Nicole Harari, CDE/WOCAT
Jana Junghardt, Caritas/Swiss NGO DRR Platform

WOCAT
World Overview of Conservation Approaches and Technologies

UNIVERSITÄT BERN
CDE CENTRE FOR DEVELOPMENT AND ENVIRONMENT

SWISS NGO DRR PLATFORM

Content

Where people and their land are safer – A compendium of DRR practices

- The rationale behind
- What we found out
- Examples
  - Honduras
  - Tajikistan
- The way forward

The rationale behind

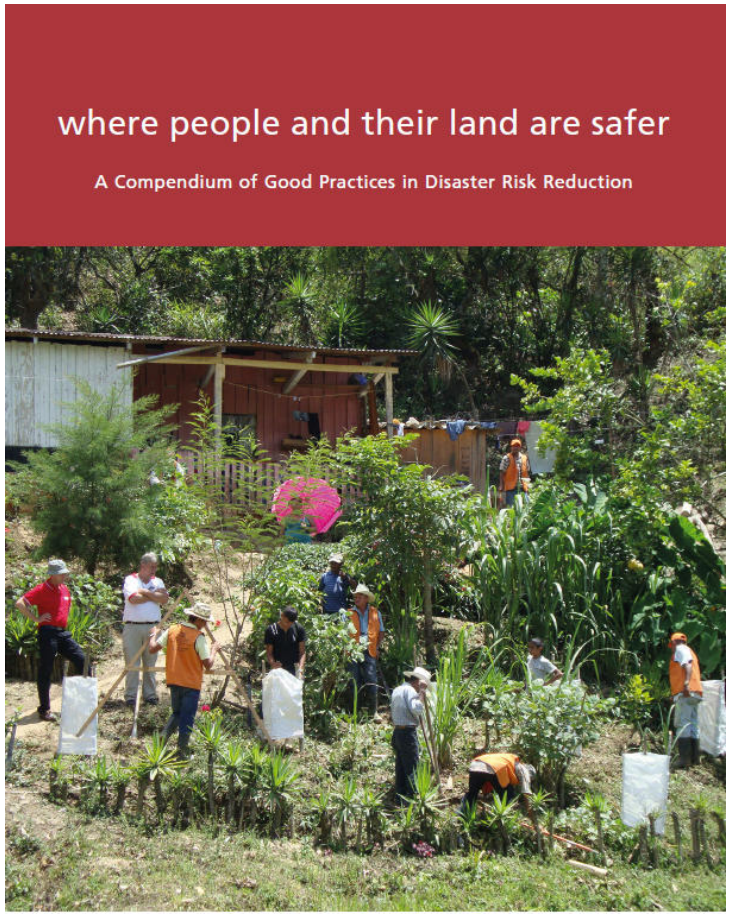
- **Why bringing SLM and DRR together?**

The institutions behind

Swiss NGO DRR Platform

CDE/ WOCAT

Overview of the book

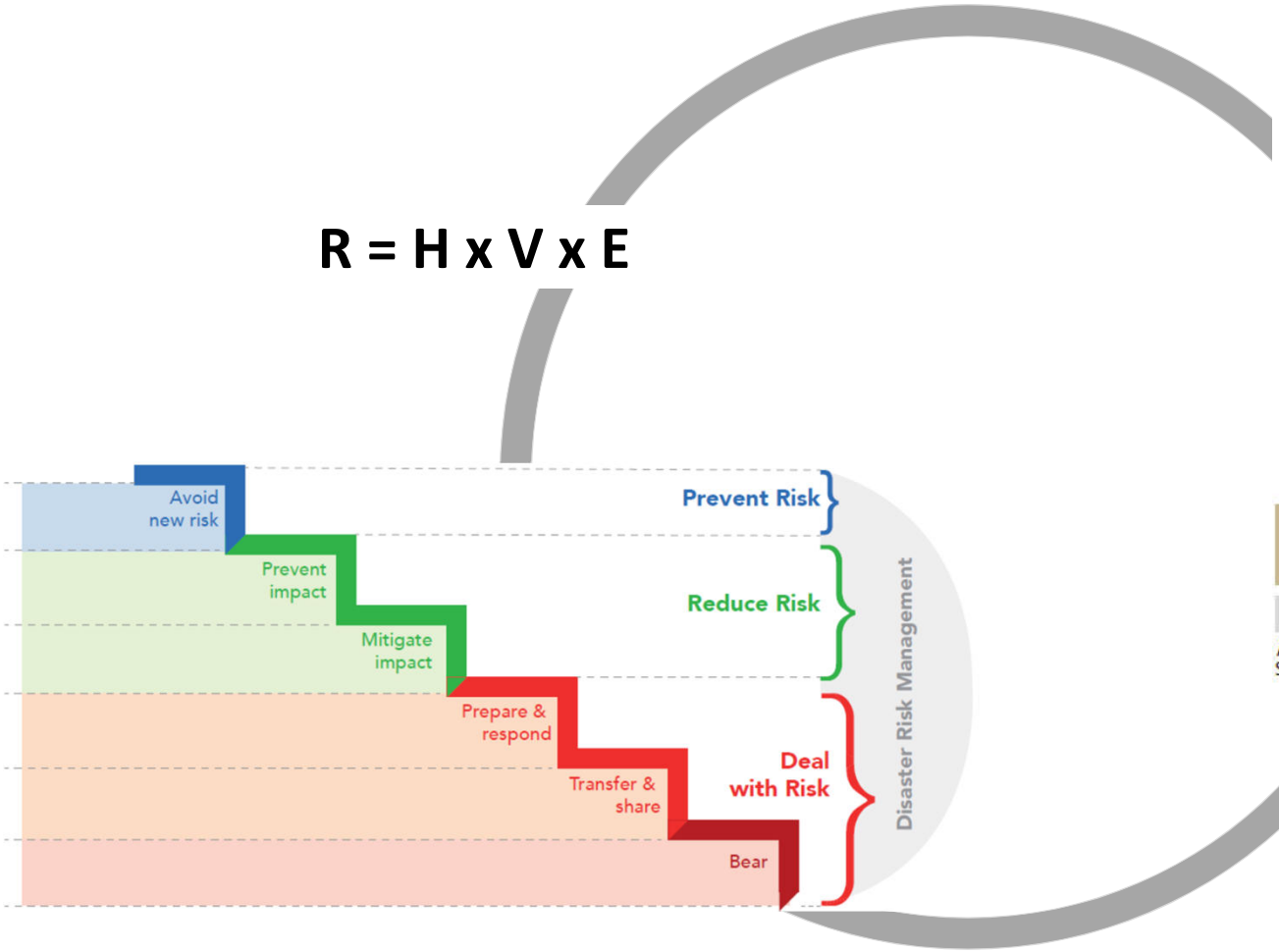


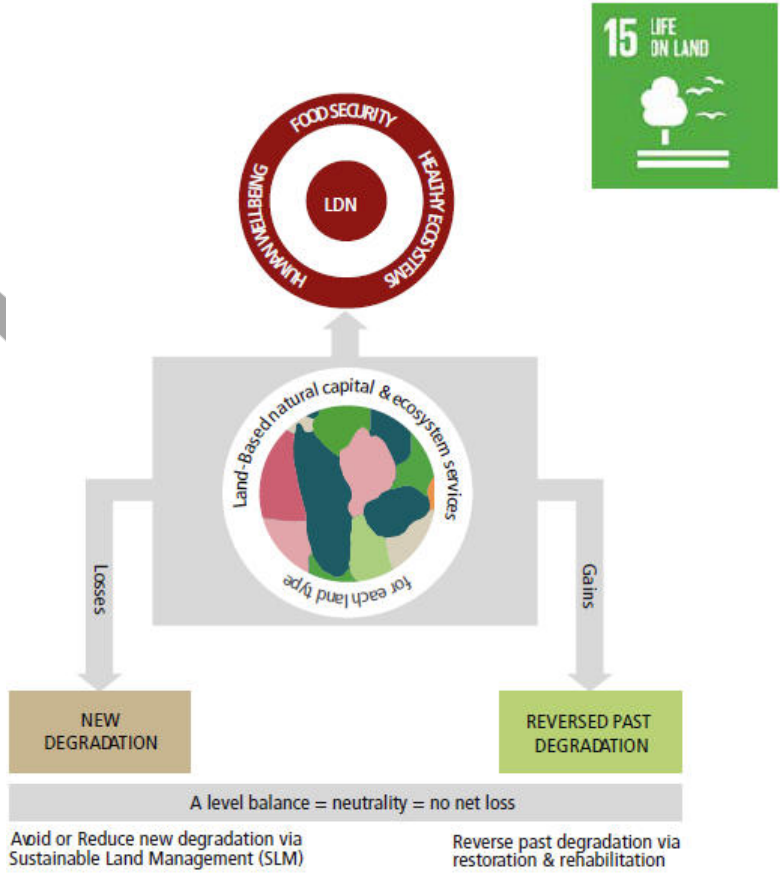
Part 1
Background and concepts
Reducing disaster risk by SLM

Part 2
Documented practices
Presentation of 30 DRR practices from around the globe

The rationale behind

$$R = H \times V \times E$$



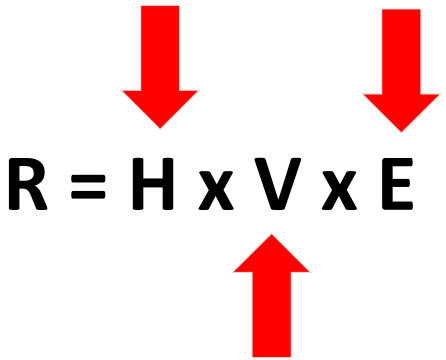


LDN objectives (Orr et al. 2017):

- Maintain or improve sustainable delivery of ESS
- Maintain or improve productivity to improve food security
- Increase the resilience of land and populations dependent on land

The DRR lens

ecosystems & land management impact on disaster risk:



The DRR lens

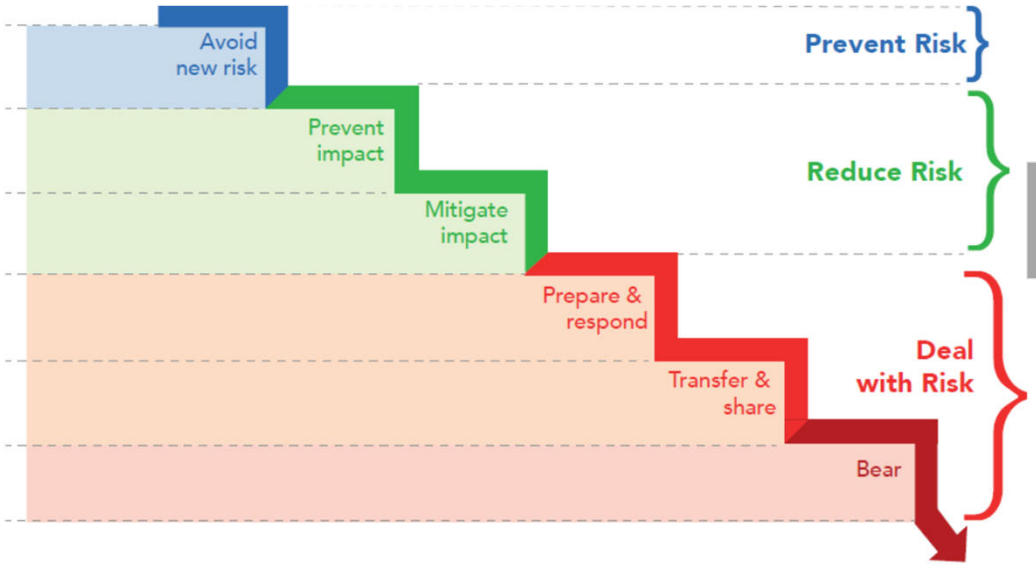


Table 1: Classification of the Technologies and Approaches through the DRR lens

Type of DRR measure	Technology	Hazard(s)	Main risk reduction function of Technology	SLM (1), SLM - DRR (2), DRR (3)	Individual or Community	Approach	Individual or community
PREVENT AND REDUCE	Water points for livestock in daily pastures	flood; rainstorm; drought; landslide	• Provides water during dry periods when rivers are dried up • In combination with rotational grazing reduce overgrazing and trampling and therewith soil erosion and landslides	2	c	Pasture User Union (PUU)	c
	Artifical reef	rainstorm	• Ensure safe fishing • Increase fish population near coast	3	c	Social Entreprise (SE)	c
	Protection of water resources	flood; drought; dry spell; wildfire; landslide	• Provide safe drinking water • Preserve water resources • Reduce water contamination • Guarantee water during times of low flow	1	c	Local consultation for action on hillsides to protect water resources	c
	Living barriers	flood; rainstorm; wildfire; landslide	• Reduce surface water runoff and improve infiltration • Reduce soil erosion • Prevent landslides • Protect infrastructure	2	I	Participatory slope stabilisation	I
	Drainage fascines	flood; rainstorm; landslide	• Reduce surface water runoff • Reduce soil erosion • Prevent landslides	3	c		
	V-shaped catchment fance using izote (Yucca sp.)	flood; rainstorm; wildfire; landslide	• Reduce soil erosion • Prevent landslides • Create area for crop production • Protect houses	2	I		
	Bench terracing	flood; rainstorm	• Reduce erosion • Increase water infiltration • Off-site benefits	1	c		
	Farming God's way	rainstorm; drought; dry spell	• Increase soil cover through minimum tillage and mulching • Increase soil fertility with application of organic manure	1	I		
	Soil and water conservation channels	flood; rainstorm	• Reduce soil erosion and surface runoff	2	c		
	Farmar Managed Natural Regeneration (FMNR)	flood; rainstorm; drought; dry spell; landslide	• Increase soil fertility • Increase water availability • Tree and grass cover	1	I/c	FMNR implementation approach	I
	Protection of microbasins through reforestation	flood; rainstorm; wildfire; landslide	• Ensure water availability • Reduce soil erosion	1	c	Legal protection of microbasins through decrees*	c
REDUCE	Protection of water infrastructure against disaster risks	flood; rainstorm; landslide	• Safe drinking water • Availability of drinking water	1	c	* links to "Legal protection of microbasins through decrees"	
	Rock catchment	rainstorm; drought	• Availability of water	2	c	Partnership with beneficiary communities in project implementation	c
	Disability-inclusive, flood resilient cluster village	flood; drought	• Safe housing • Food security • Reduce erosion	3	c	Disability-inclusive Disaster Risk Reduction	c
	Sub-surface water harvesting for more efficient use of water resources	flood; drought	• Water harvesting to ensure water availability	2	c	Water Use Management Plan (WUMP)	c
	Terra Prata raised garden beds	flood; rainstorm; drought; dry spell	• Enable crop production (where previously no crops were cultivated) • Reduce soil erosion • Enhance soil fertility • Increase food self-sufficiency and malnutrition	1	I	Approach at household level for Terra Prata home gardens	I
		flood; drought				Collection, selection, breeding and dissemination of locally adapted rice varieties at the Local Agricultural Research and Extension Centre LAREC	c
	Keyhole garden	flood; rainstorm; drought	• Enhance dietary diversity • Increase duration of gardening period • Protect garden from flooding • Withstand salt water tidal intrusion	2	I	Peer to peer pass-on approach with women	I
	Floating garden	flood; rainstorm	• Ensure production during floods • Food and nutrition security	2	I		
	Pond Sand Filter (PSF)	flood; drought	• Safe drinking water	2	I		
	Improved pearl millet variety HKP	drought; wildfire	• Increase production • Guarantee food security	2	I	Training and awareness-raising in the use of improved agricultural techniques **	I
	Improved cowpea variety (IT90K372-1-2)	drought; wildfire	• Increase production • Guarantee food security	2	I		
DEAL WITH	Multi-nutritional foddar blocks for livestock	drought; wildfire	• Guarantee animal food security	3	I	** links to "Training and awareness-raising in the use of improved agricultural techniques"	
	Multigrain nutrient ball	flood; drought; dry spell	• Support balanced nutrition during floods • Can be included in the flood preparedness list of dry foods	3	I	Eradicating malnutrition by promoting locally produced Horlicks	I
	Emergency infrastructure including shelter and linked transport infrastructure	flood; rainstorm	• Protection of people and assets	3	c	Early warning message dissemination	c
		flood; drought				Community safety nets – Establishment of rice seed banks at village level	c
		flood; rainstorm; drought; dry spell; landslide				Comprehensive Agrarian Risk Management (GRAI)	c
		flood; drought; wildfire				Community storage facilities	c
		flood; rainstorm				Early warning system	c
		flood; drought; dry spell; landslide				Creating municipal risk management units (UGR) with a participatory approach	c

The SLM lens

SLM classification:

Land-based:

- Reforestation, vegetation cover improvement
- Cross-flow barriers & drainage

Land-and water-based:

- Productive infrastructure

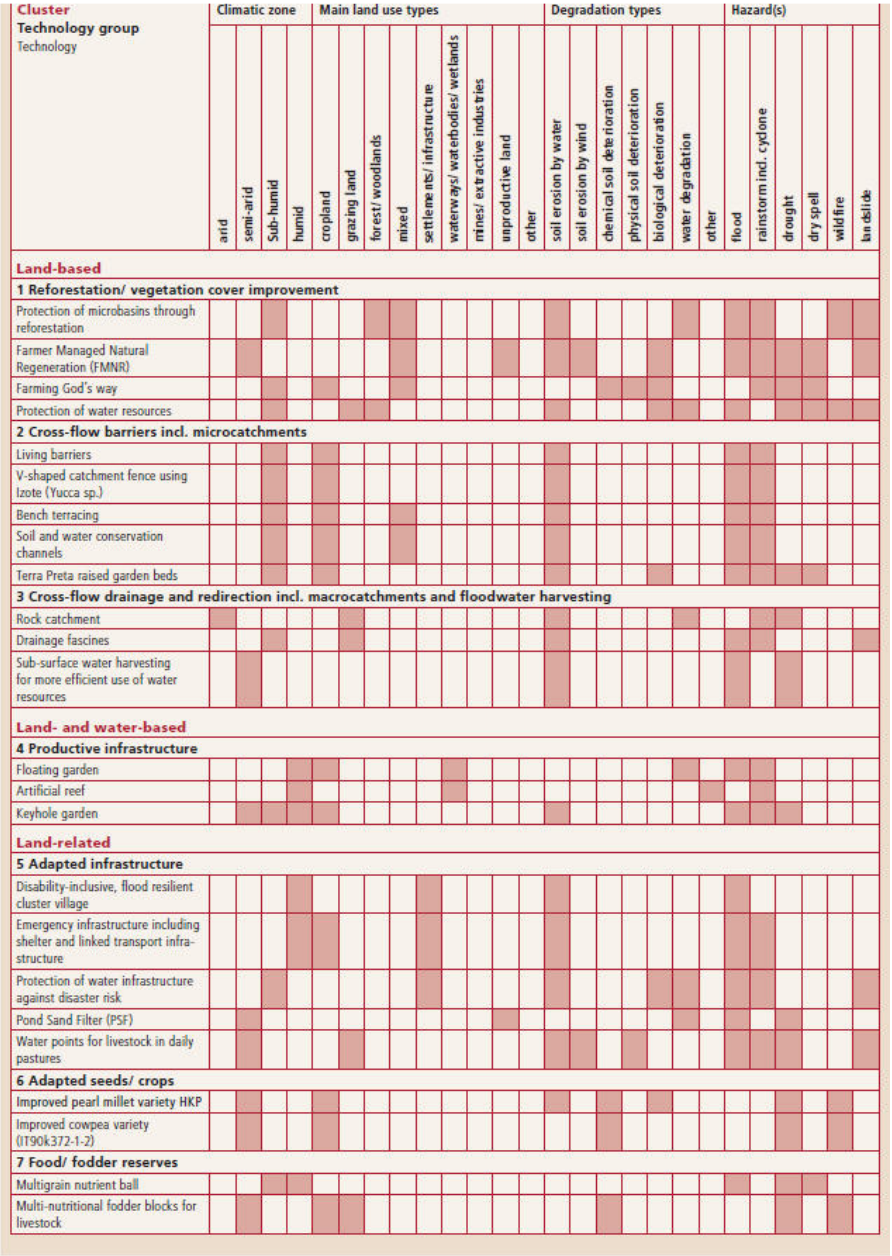
Land-related

- Adapted infrastructure, adapted seeds/ crops, food/ fodder reserves

Overview of measures per:

- Climatic zone
- Land use
- Type of degradation
- Hazard

… to support selection of measures

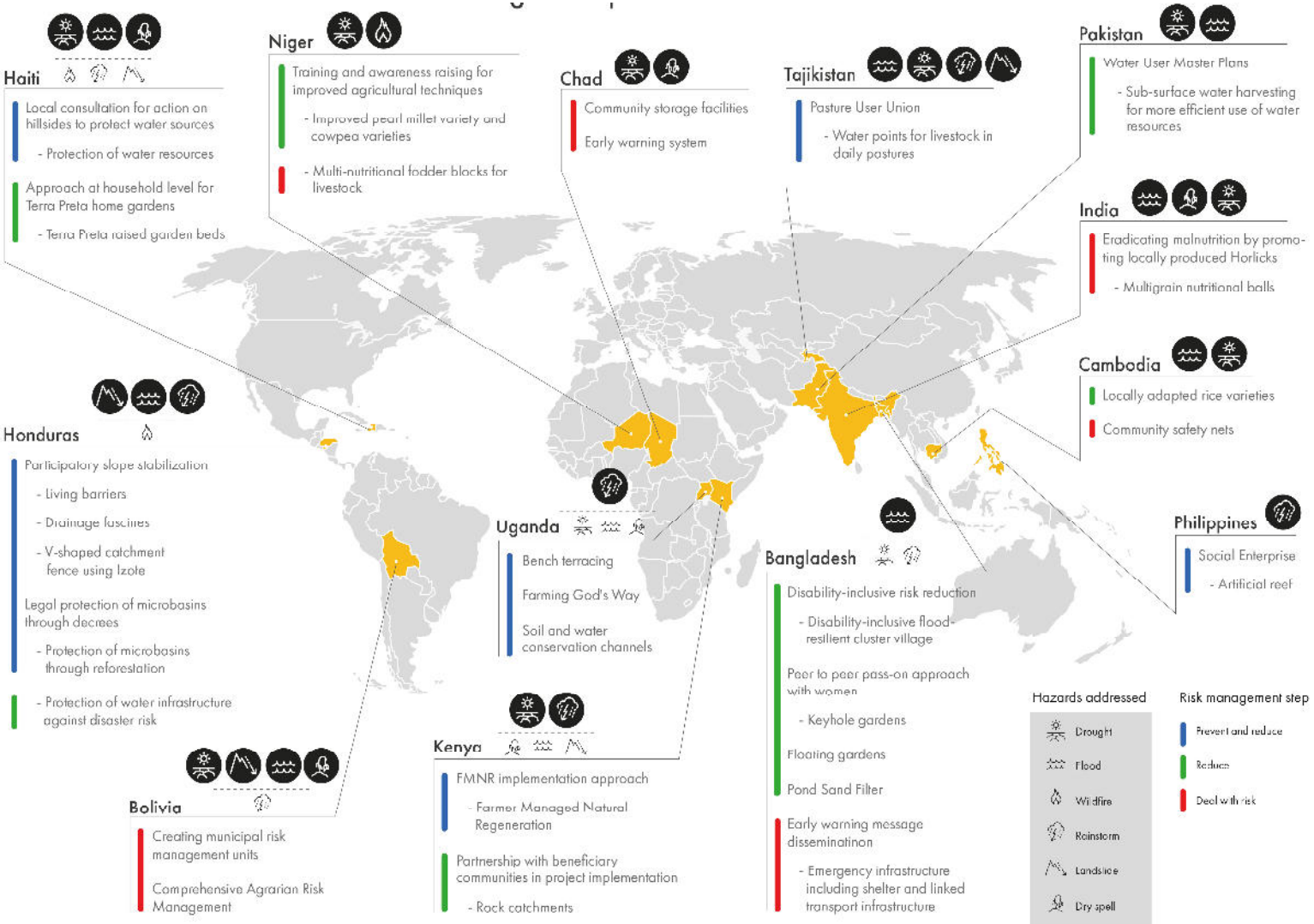


Cluster / Technology group / Technology	Climatic zone				Main land use types									Degradation types							Hazard(s)						
	arid	semi-arid	Sub-humid	humid	cropland	grazing land	forest/ woodlands	mixed	settlements/ infrastructure	waterways/ waterbodies/ wetlands	mines/ extractive industries	unproductive land	other	soil erosion by water	soil erosion by wind	chemical soil deterioration	physical soil deterioration	biological deterioration	water degradation	other	flood	rainstorm incl. cyclone	drought	dry spell	wildfire	landslide
Land-based																											
1 Reforestation/ vegetation cover improvement																											
Protection of microbasins through reforestation			■				■	■						■					■		■	■			■	■
Farmer Managed Natural Regeneration (FMNR)		■						■				■		■	■			■			■	■	■	■		■
Farming God's way			■		■			■								■	■	■				■	■	■		
Protection of water resources			■			■	■							■				■	■		■		■	■	■	■
2 Cross-flow barriers incl. microcatchments																											
Living barriers			■		■									■							■	■				
V-shaped catchment fence using Izote (Yucca sp.)			■		■									■							■	■				
Bench terracing			■		■			■						■							■	■				
Soil and water conservation channels			■		■			■						■							■	■				
Terra Preta raised garden beds			■		■									■				■			■	■	■	■		
3 Cross-flow drainage and redirection incl. macrocatchments and floodwater harvesting																											
Rock catchment	■					■								■					■			■	■				
Drainage fascines			■			■								■							■	■				■
Sub-surface water harvesting for more efficient use of water resources		■												■							■		■			
Land- and water-based																											
4 Productive infrastructure																											
Floating garden				■	■					■									■		■	■	■				
Artificial reef				■						■										■	■	■					
Keyhole garden		■	■	■	■									■							■	■	■				
Land-related																											
5 Adapted infrastructure																											
Disability-inclusive, flood resilient cluster village				■					■					■							■						
Emergency infrastructure including shelter and linked transport infra-structure				■	■				■					■							■	■					
Protection of water infrastructure against disaster risk			■						■					■				■	■		■	■				■
Pond Sand Filter (PSF)		■										■							■		■		■			
Water points for livestock in daily pastures		■				■								■	■		■				■	■	■			■
6 Adapted seeds/ crops																											
Improved pearl millet variety HKP		■			■									■		■		■					■		■	
Improved cowpea variety (IT90k372-1-2)		■			■											■							■		■	
7 Food/ fodder reserves																											
Multigrain nutrient ball			■	■																	■		■	■		
Multi-nutritional fodder blocks for livestock		■			■	■										■							■		■	

What we found out

> Results from the collaboration

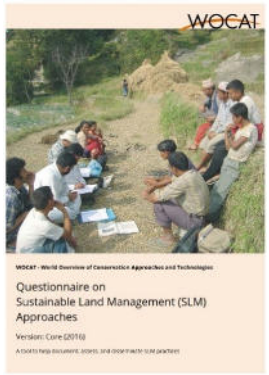
The whole picture: SLM practices for DRR



Documentation of Technologies and Approaches

Example: Keyhole Garden (Bangladesh)

An **SLM Technology** *is a physical practice on the land that controls land degradation, enhances productivity, and/ or other ecosystem services. A Technology consists of one or more measures, namely agronomic, vegetative, structural, and management measures* (WOCAT 2017).



Example: Peer to peer pass-on approach with women (Bangladesh)

An **SLM Approach** *defines the ways and means used to implement one or more SLM Technologies. It includes technical and material support, involvement and roles of different stakeholders, etc. An Approach can refer to a project/ programme or to activities initiated by land users themselves* (WOCAT 2017).

SLM practice

entered in:

Addressed hazards & Land use types

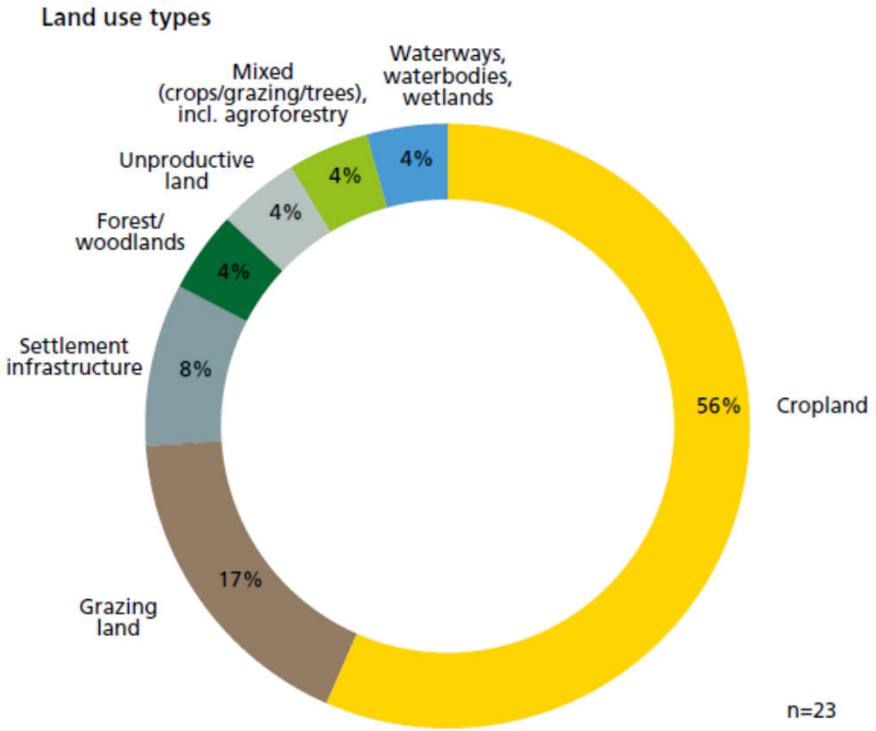
Floods

Droughts & Dryspells

Landslides

Rainstorms

Wildfire



Multi-purpose character

Main purposes of technologies

- Risk Management: 24/24

(DRR/CCA)

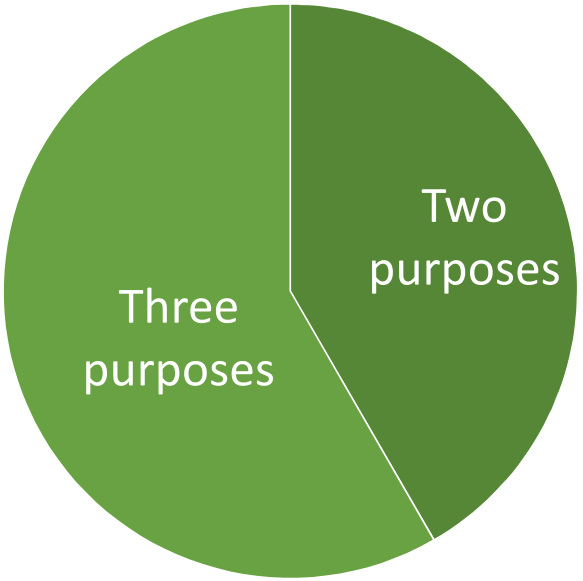
- Healthy Ecosystems: 20/24

(land degradation, watersheds, CCM, conservation, biodiversity)

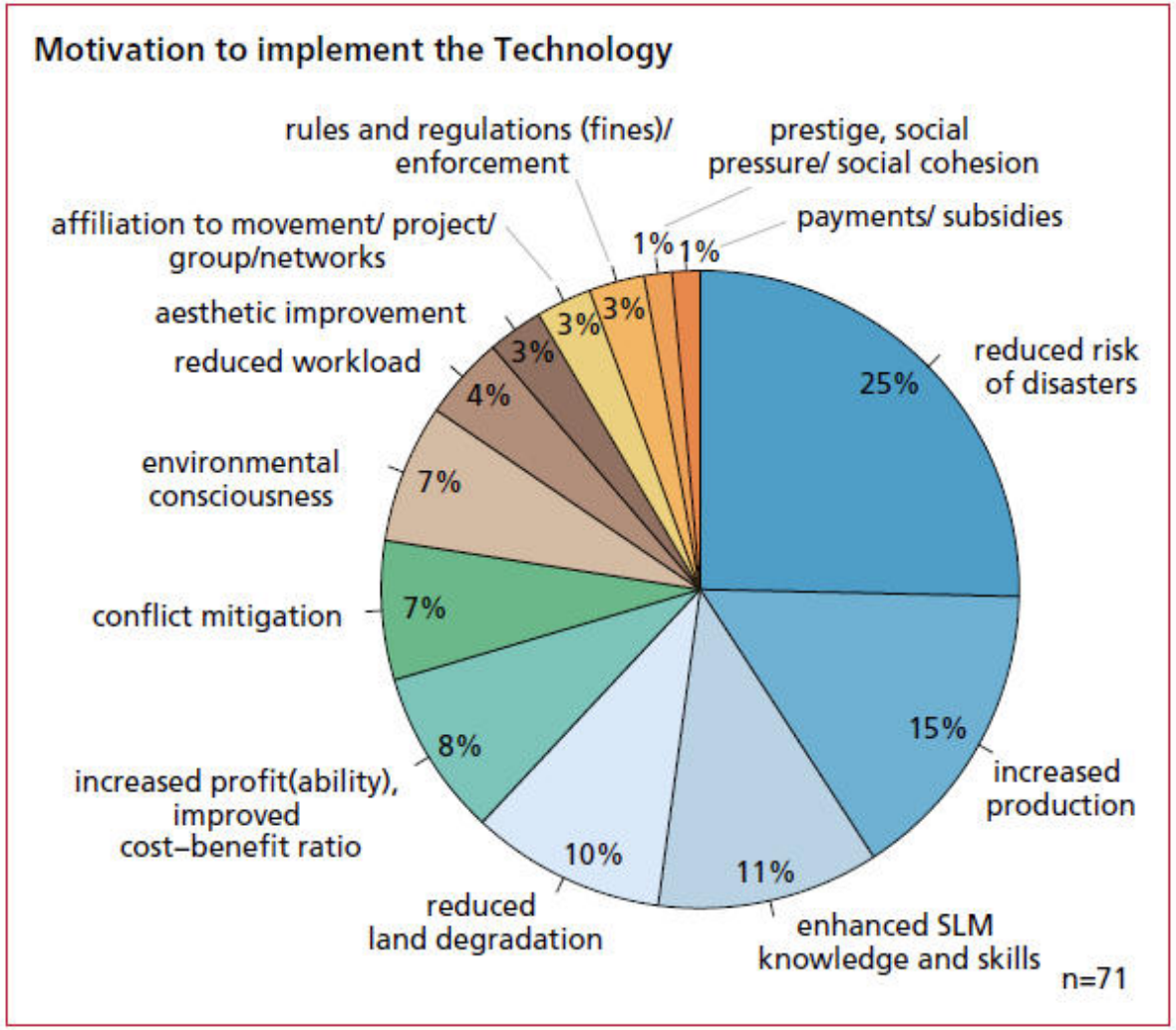
- Livelihoods & production: 18/24

(create social and economic benefit, improve production)

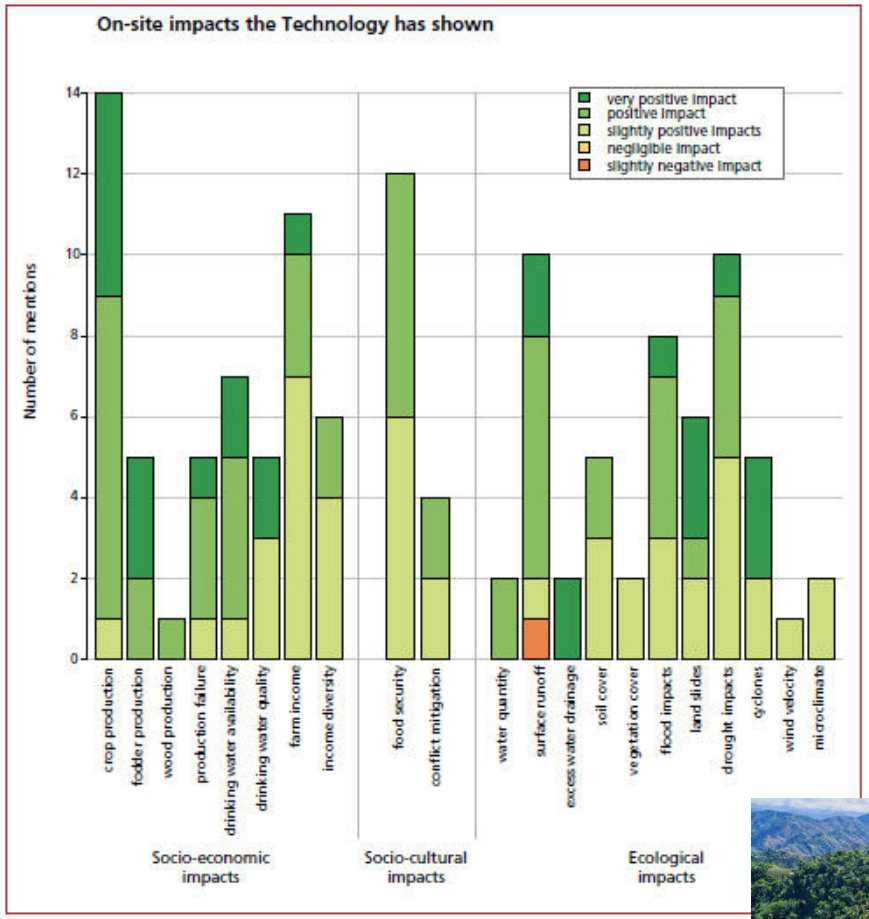
- All technologies with more than one purpose

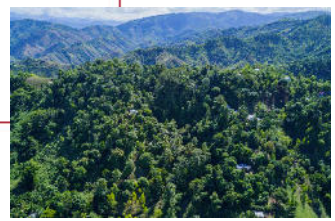


… also reflected in the motivation to implement the Technology

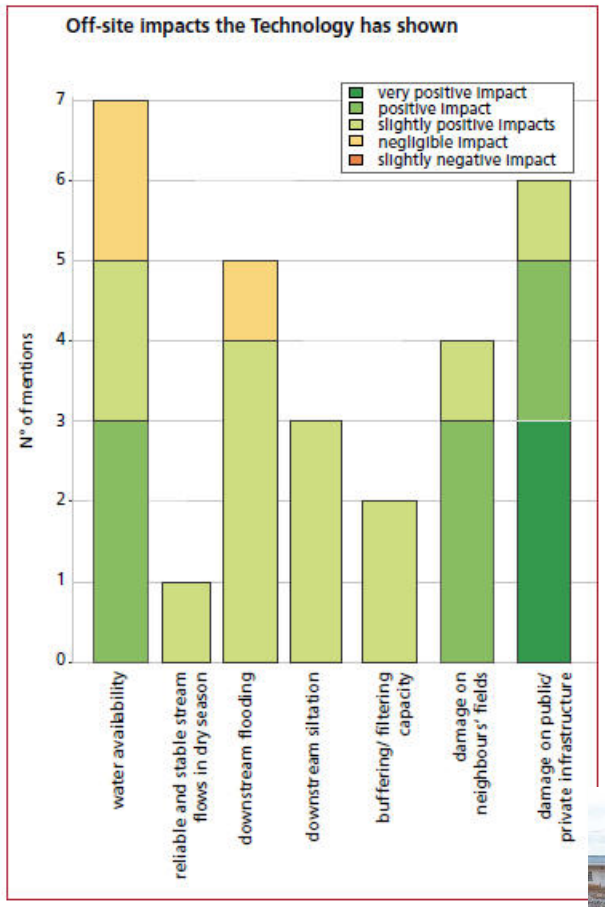


On- and off-site impacts





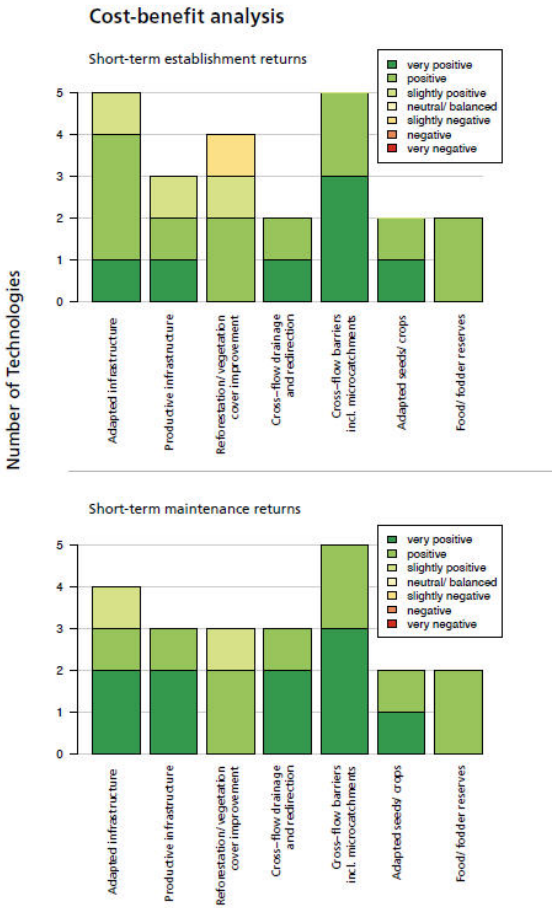
Agroforestry plot in Haiti, HP Liniger



→ not easy to prove whether, and to what extent

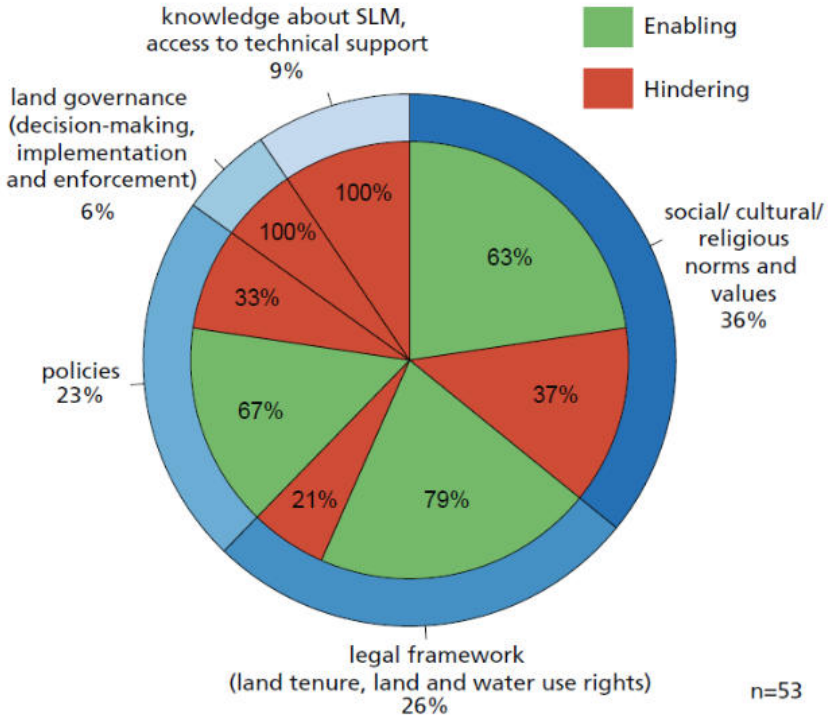
Flooding in Tajikistan, HP Liniger

Cost-benefit perception



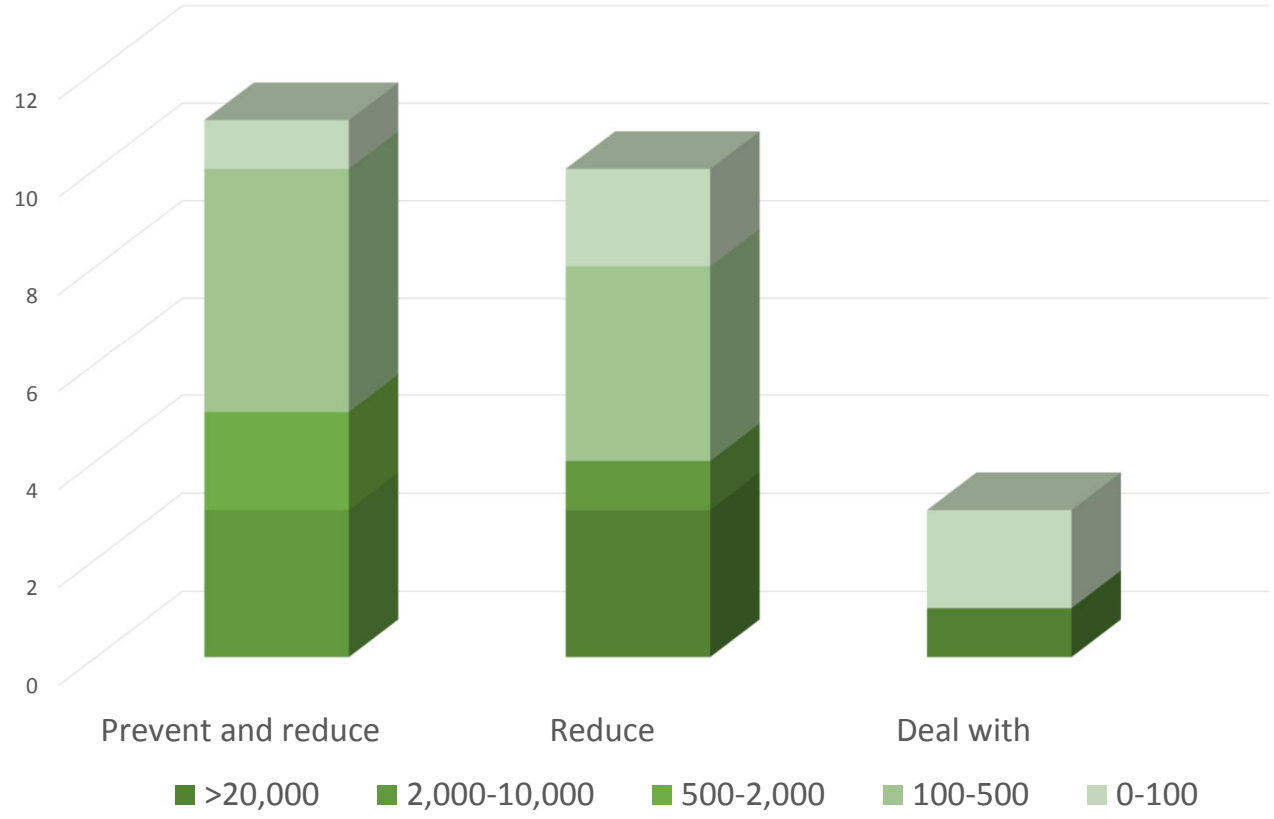
- SLM solutions in DRR are cost-effective, even short-term

Enabling and hindering factors for the implementation of Technologies



- norms and values are crucial for implementation
- more investment in supportive policies/ legal framework & capacities/ knowledge

Establishment cost from a DRR-perspective



YOUR TURN

- Q & A
- Your thoughts, challenges & experience

Insights from the field

- **Honduras**
- **Tajikistan**

PREVENT AND REDUCE

Fishbone shaped ditches ready to be filled with fascine bundles before being covered with soil (Helen Gambon, Swiss Red Cross).

Drainage fascines (Honduras)

DESCRIPTION

Fascine drains are used to drain excess water from elevated lands that might otherwise affect land or houses below as surface runoff. They help prevent landslides and gully formation.

The Department of Olancho is a rainforest area located in the mountain range area of Cordillera Central and Sierra de Agalta, at an average altitude of 1,500 masl. Though most of Olancho is protected as a natural reserve or natural park, there are high levels of deforestation resulting from livestock keeping and intense industrial forest management practices. However, small-scale farmers also cause deforestation. These practices result in forest fires, soil degradation and erosion. The Department of Olancho is regularly affected by tropical storms and hurricanes coming in from the Atlantic. This combination of adverse natural phenomena, topographic exposure and harmful use of natural resources causes significant material damage and even human deaths. Fascine drains are used to remove excess water from slopes that affect lands or houses in lower areas. The technology helps

LOCATION

Location: Dulce Nombre de Culmí municipality, Río Blanco community, Departament of Olancho, Honduras

Average annual rainfall

- < 250 mm
- 251-500 mm
- 501-750 mm
- 751-1000 mm
- ✓ 1001-1500 mm
- 1501-2000 mm
- 2001-3000 mm
- 3001-4000 mm
- > 4000 mm

Agro-climatic zone

- humid
- ✓ sub-humid
- semi-arid
- arid

Main purpose

- improve production
- ✓ reduce, prevent, restore land degradation
- conserve ecosystem
- ✓ protect a watershed/ downstream areas – in combination with other Technologies
- preserve/ improve biodiversity
- ✓ reduce risk of disasters
- adapt to climate change/ extremes and its impacts
- mitigate climate change and its impacts
- create beneficial economic impact
- create beneficial social impact

Land use

Grazing land - Main animal species and products: Cow
Grasses
Intensive grazing/ fodder production: Cut-and-carry/ zero grazing

Degradation addressed

soil erosion by water - Wt: loss of topsoil/ surface erosion, Wr: riverbank erosion

Hazards: Floods, cyclones, landslides

IMPACTS - BENEFITS AND DISADVANTAGES

Socio-economic impacts			
fodder production	decreased		increased
animal production	decreased		increased
workload	increased		decreased
Socio-cultural impacts			
SLM/ land degradation knowledge	reduced		improved
Ecological impacts			
surface runoff	increased		decreased
excess water drainage	reduced		improved
soil loss	increased		decreased
nutrient cycling/ recharge	decreased		increased
biomass/ above ground C	decreased		increased
landslides/ debris flows	increased		decreased
impacts of cyclones, rainstorms	increased		decreased
Off-site impacts			
damage on neighbours' fields	increased		decreased

The slope on which the fascines have been implemented behind this house has been closed with a fence to impede the entrance of livestock (Helen Gambon, Swiss Red Cross).

Technologies and related Approach


Honduras

Living barriers

in PDF


Honduras

Drainage fascines

p 85


Honduras

V-shaped catchment fence using Izote (*Yucca sp.*)

in PDF


Honduras

Participatory slope stabilisation

Additional DRR Information available

p 91

PREVENT AND REDUCE

Diverse bioengineering measures are combined to stabilise a slope that poses a risk to a house nearby (Helen Gambon, Swiss Red Cross).

Participatory slope stabilisation (Honduras)

Bioingeniería

DESCRIPTION

Bioengineering includes a series of techniques based on the use of living vegetation to protect slopes and embankments from erosion and landslides. Bioengineering measures are designed according to comprehensive risk assessment; they are multi-purpose as a whole, and have low establishment and maintenance costs. They also enhance the capacities of families and communities to mitigate disaster hazards, to enhance health and food security, and to strengthen community organisations also.

LOCATION

TECHNICAL SUPPORT, CAPACITY BUILDING, AND KNOWLEDGE MANAGEMENT

The following activities or services have been part of the approach

- ✓ Capacity building/ training
- ✓ Advisory service
- ✓ Institution strengthening (organisational development)
- ✓ Monitoring and evaluation
- ✓ Research

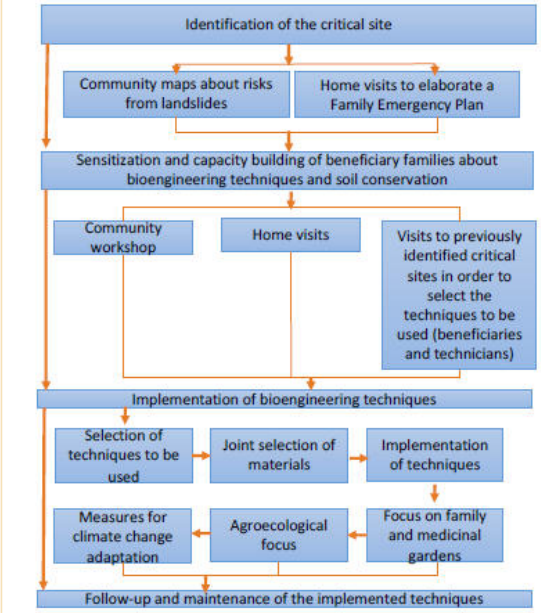
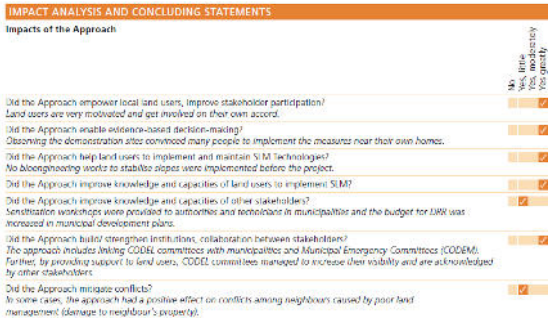


Figure: Carmen Paguada, Honduran/ Swiss Red Cross



IMPACT ANALYSIS AND CONCLUDING STATEMENTS

Impacts of the Approach

	No	Yes, little	Yes, moderately	Yes, greatly
Did the Approach empower local land users, improve stakeholder participation? *Land users are very motivated and get involved on their own accord.*				✓
Did the Approach enable evidence-based decision-making? *Observing the demonstration sites convinced many people to implement the measures near their own homes.*				✓
Did the Approach help land users to implement and maintain SLM Technologies? *No bioengineering works to stabilize slopes were implemented before the project.*				✓
Did the Approach improve knowledge and capacities of land users to implement SLM?				✓
Did the Approach improve knowledge and capacities of other stakeholders? *Sensitization workshops were provided to authorities and technicians in municipalities and the budget for DRR was increased in municipal development plans.*				✓
Did the Approach build/ strengthen institutions, collaboration between stakeholders? *The approach includes linking CODEL committees with municipalities and Municipal Emergency Committees (CODEM). Further, by providing support to land users, CODEL committees managed to increase their visibility and are acknowledged by other stakeholders.*				✓
Did the Approach mitigate conflicts? *In some cases, the approach had a positive effect on conflicts among neighbours caused by poor land management (damage to neighbour's property).*				✓

Context

- Highly degraded watersheds due to combination of natural and human factors
- **Land use type:** cropland and grazing land
- Presented measures embedded in a larger project on Integrated Watershed Management

Livestock waterpoints, Tajikistan

TECHNOLOGY

Main purpose:
- Reduce land degradation

Setup
- Water points are set up at strategic locations

Achievements
- Improved animal production and health, water availability, farm income, work load

Challenges
- Partly surface runoff, water flow not regulated
- Establishment costs are still considered too high to be fully borne by land users
- Water points and farms are remote, resources needed for construction and maintenance

Pasture User Unions, Tajikistan

APPROACH

Main purpose:

- Enhance rights and profit of livestock owners at the community level
- Strenghten local institutions for sustainable land management

PUU

- Obtain ownership of communal collective pasture land
- Have the right to collect fees to improve pasture
- Right to balance livestock and available fodder

Annual budget in USD for the SLM component

- ✓ < 2000
- 2000-10000
- 10000-100000
- 100000-1000000
- > 1000000

Precise annual budget: 1000.0

Comment: Collection of fees per head of livestock.

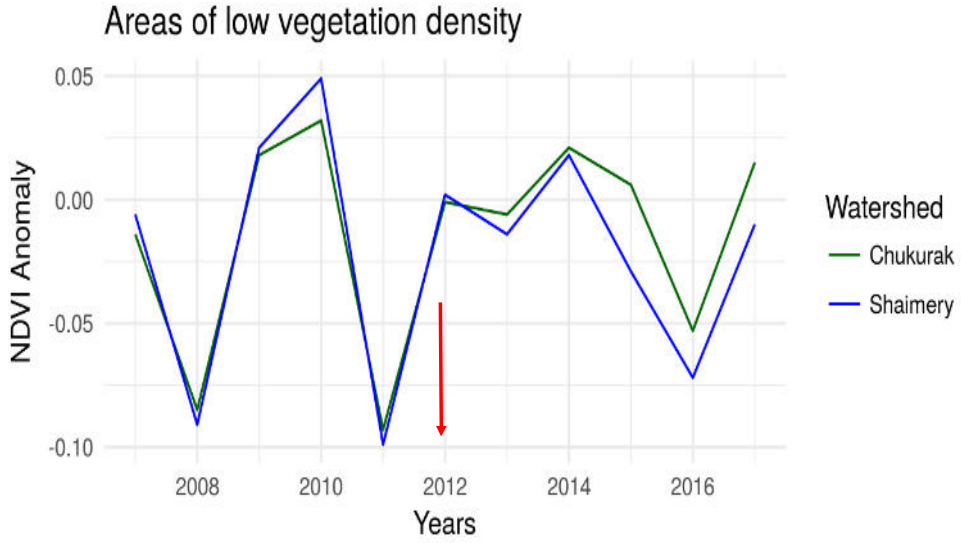
➔Key institution for sustainable land management in highly disaster-prone area

➔Sustainability through self-sustained funding

➔Incentives for livestock destocking

JJ10 Kann auch 2 slides sein, je nachdem.
Jana Junghardt; 26.03.2018

Achievements



Land degradation reduced

Local empowerment and behaviour change

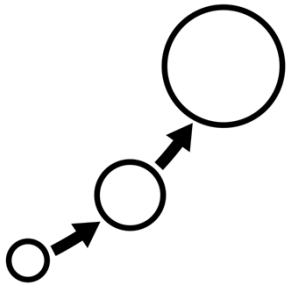
NH18

The way forward

- **How to use the publication**
- **Conclusions for communities of practice**

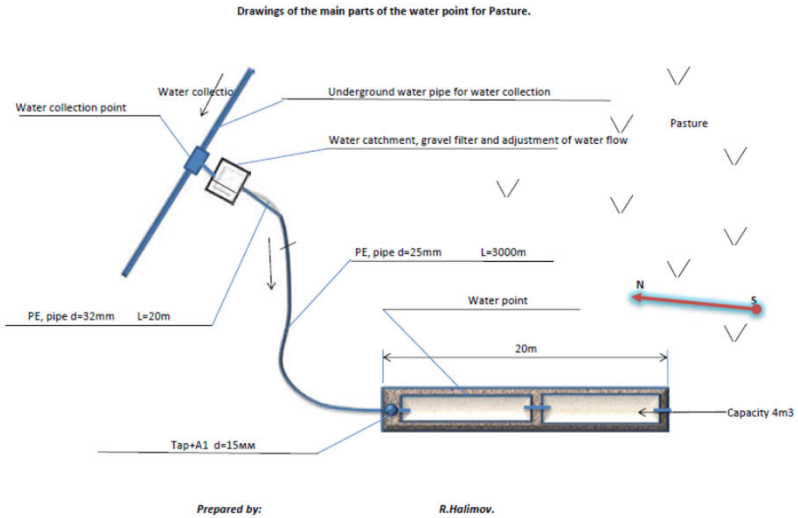
NH18 the book??? then we would need to provide different conclusions I guess...
Nicole Harari; 27.03.2018

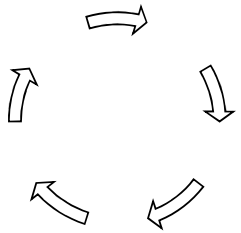
How to use the publication



- Systematic documentation of practices: Linking technical measures with overarching approaches

- Allows to compare approaches in similar risk contexts and learn from each other
  → Peer-to-peer learning
  → Adoption with technical drawings





Conclusions for the DRR-community

- WOCAT database very suitable for prevention & risk reduction
  less for dealing with risk
- Dissemination of standardized documentation database to exchange with SLM and eco-DRR community
- Improved justification to move from dealing with risk to risk reduction and prevention, particularly for extensive risk
- Multi-purpose character of SLM measures contributes to adoption and sustainability in DRR-projects and programmes
- Consider land and ecosystems in risk assessments

NH19
JJ29

Conclusions for the SLM community

- High potential of simple SLM measures to reduce impacts of repeated small-scale disaster events → helping the poorest on the most degraded land to get out of the vicious cycle of poverty, degradation and disaster

- A lot of SLM is already done in DRR → need to learn and built on these experiences to further promote land-based solutions in DRR

- Highlight the productive protection function of SLM in DRR to those implementing DRR measures

- Resilient land for resilient people → promote scaling up of SLM activities from plot to landscape/ watershed level to increase resilience of the land and contribute to more resilient households and communities under DRR interventions

NH19 muss ich noch umschreiben, d.h. kürzen
Nicole Harari; 27.03.2018

JJ29 OK, sollten klären welche poilcy points von wem genannt werden. Der 2. ist klar ein Aufruf an die DRR-Community, hier mehr zu tun.
Jana Junghardt; 27.03.2018

Outlook & Info

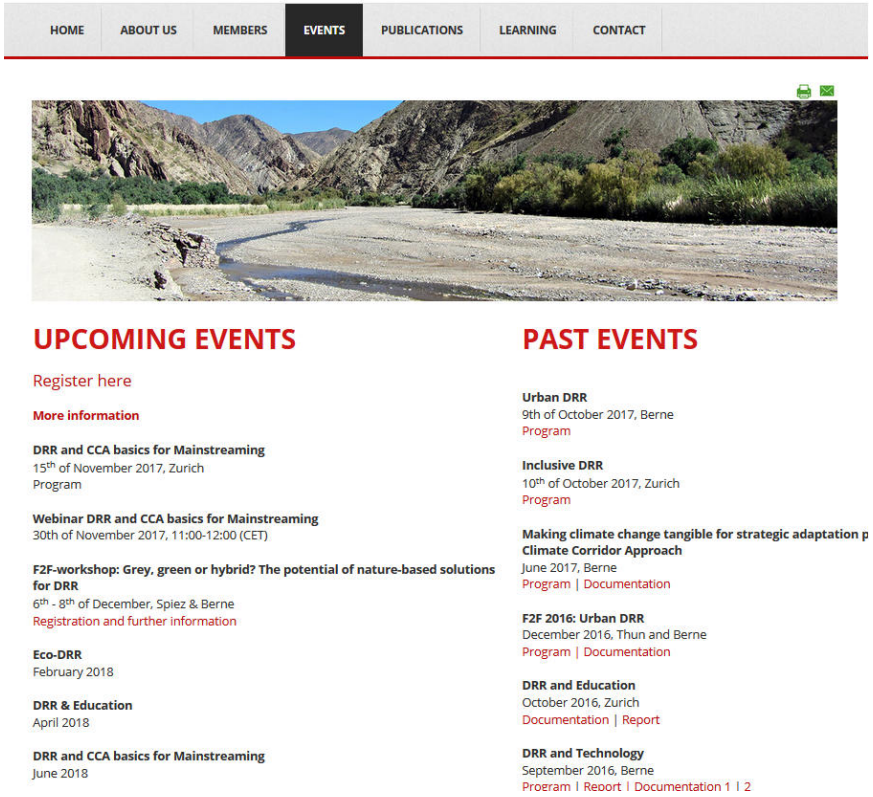
- **Platform Events**
- **WOCAT Info**

Upcoming

1-day learning events in 2018, in Switzerland

- DRR & Education, 16th of May
- DRR/CCA-Mainstreaming, 20th of June
- DRR & Water, October
- DRR & Fragility, 6th of November

http://drrplatform.org/events



E-learning course

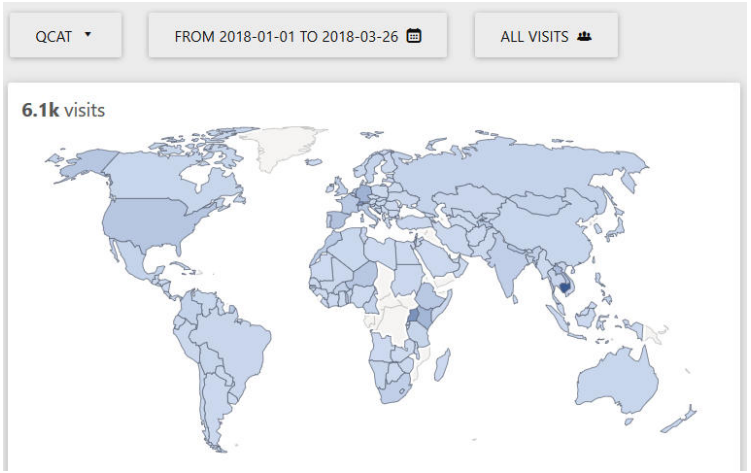
http://drrplatform.org/learning

WOCAT

World Overview of Conservation Approaches and Technologies

www.wocat.net

https://qcat.wocat.net



nicole.harari@cde.unibe.ch

wocat@cde.unibe.ch

YOUR TURN

- Q & A
- Your thoughts, challenges & experience


Los Sabanas
Cerro Loma Atravesado
Cerro El Duende
N
O
E
S
Trocha
Camino secundario
Camino principal
Río
Vertiente
Montaña
Laguna artificial
Pozo excavado
Sequía
Incendio
Programa de Gestión de Riesgos

Context: Community storage & EWS Chad

DEAL WITH

APPROACH

- **Main purpose**:
- Disseminate real-time information on risks related to food insecurity
- Increase resilience by local knowledge and ownership

- Main purpose
- Hazards addressed
- Land use type
- Degradation addressed

JJ10 Kann auch 2 slides sein, je nachdem.
Jana Junghardt; 26.03.2018

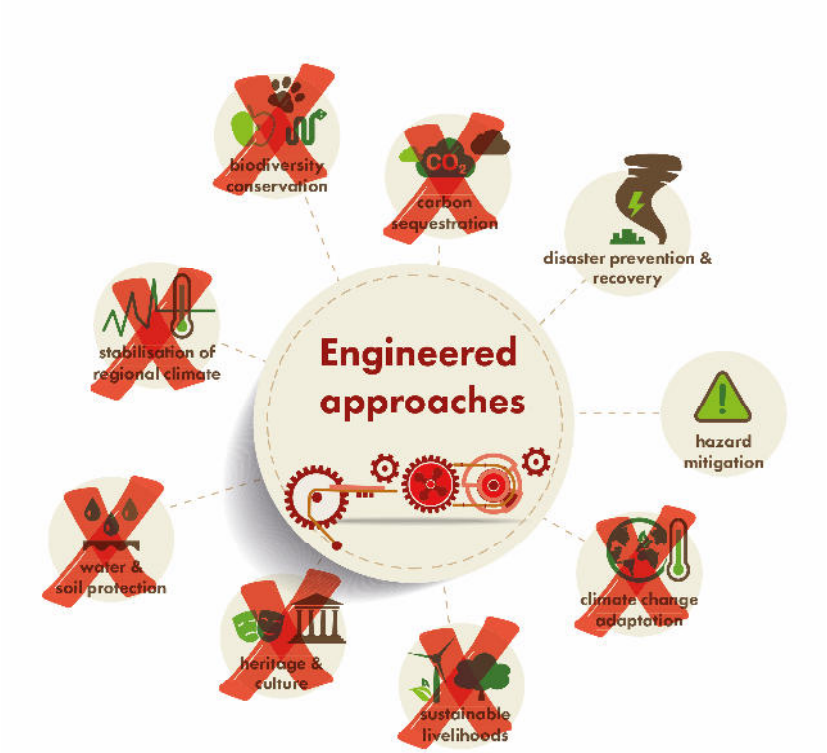

adaptation
eco-DRR
ecosystem
restoration
ecosystem-based
natural
DRR
EbA
infrastructure
nature-based
green
solutions
environment
approach

NH4 für was ist das???
Nicole Harari; 27.03.2018

JJ16 Einbettung unserer Publikation in den Diskurs zu nature-based solutions for DRR. Jacqueline hatte darum gebeten.
Jana Junghardt; 27.03.2018

JJ17 WEnn wir zuviele haben, kann ich diesen Slide auch rausnehmen.
Jana Junghardt; 27.03.2018

NH7
NH10


Engineered approaches
biodiversity conservation
carbon sequestration
disaster prevention & recovery
hazard mitigation
climate change adaptation
sustainable livelihoods
heritage & culture
water & soil protection
stabilisation of regional climate


Ecosystem management
biodiversity conservation
carbon sequestration
disaster prevention & recovery
hazard mitigation
climate change adaptation
sustainable livelihoods
heritage & culture
water & soil protection
stabilisation of regional climate

NH7 braucht es das? nehme an, dass ist für diese Zuschauer klar... und ist ja so im Buch nicht drin...
Nicole Harari; 27.03.2018

NH10 ich würde nicht Sachen zeigen, die nicht im Buch sind sondern auf das Buch und die Resultate fokussieren, sonst verwirren wir die Leute...
Nicole Harari; 27.03.2018

NH9
JJ19

Aims/ functions of the Technology groups

Technology Group	Main Aims
Reforestation/ vegetation cover improvement	• Increase infiltration • Increase soil water • Recharge groundwater • Reduce evaporation • Improve microclimate • Reduce runoff and erosion • Reduce runoff velocity • Reduce wind velocity
Cross-flow barriers including microcatchments	• Increase infiltration • Water harvesting (micro) • Increase soil water • Recharge groundwater • Reduce runoff and erosion • Reduce runoff velocity
Cross-flow drainage and redirection including macrocatchments and floodwater harvesting	• Water harvesting (macro, flood) • Reduce runoff and erosion (gully) • Reducing runoff velocity • Discharge/ redirect safely • Increase infiltration • Control flow velocity and reduce peak flows
Productive infrastructure	• Be dynamic/ flexible/ adapt in/ to water • Reduce risk of production loss
Adapted infrastructure	• Move people and assets out of the danger zone • Secure safe water
Adapted seeds/crops	• Reduce the risk of harvest failure
Food/ fodder reserves	• Reduce the risk of famine/ food/ fodder shortage

NH9 kann man auch auslassen - wäre dafür da, um die Funktionen der Gruppen aufzuzeigen
Nicole Harari; 27.03.2018

JJ19 würde ich für präsentation rausnehmen bzw. als backup slide
Jana Junghardt; 27.03.2018

JJ21

Concrete examples (acc. to risk staircase)

Technology		Approach	
PREVENT AND REDUCE			
 Tajikistan	**Water points for livestock in daily pastures** Additional DRR Information available p 53	 Tajikistan	**Pasture User Union** Additional DRR Information available p 61
 Philippines	**Artifical reef** in PDF	Philippines	**Social Entreprise (SE)** in PDF
 Haiti	**Protection of water resources** p 69	 Haiti	**Local consultation for action on hillsides to protect water resources** Additional DRR Information available p 77
 Honduras	**Living barriers** in PDF	 Honduras	**Participatory slope stabilisation** Additional DRR Information available p 91
 Honduras	**Drainage fascines** p 85		
 Honduras	**V-shaped catchment fence using Izote (*Yucca sp.*)** in PDF		
 Uganda	**Bench terracing** in PDF		
 Uganda	**Farming God's way** in PDF		
 Uganda	**Soil and water conservation channels** p 99		
 Kenya	**Farmer Managed Natural Regeneration (FMNR)** Additional DRR Information available p 107	 Kenya	**FMNR implementation approach** p 119
 Honduras	**Protection of microbasins through reforestation** in PDF	 Honduras	**Legal protection of microbasins through decrees*** in PDF

Technology		Approach	
REDUCE			
 Honduras	**Protection of water infrastructure against disaster risks** in PDF	Honduras	** links to "Legal protection of microbasins through decrees"*
 Kenya	**Rock catchment** p 125	 Kenya	**Partnership with beneficiary communities in project implementation** Additional DRR Information available p 133
 Bangladesh	**Disability-inclusive, flood resilient cluster village** Additional DRR Information available p 141	 Bangladesh	**Disability-inclusive Disaster Risk Reduction** Additional DRR Information available p 151
 Pakistan	**Sub-surface water harvesting for more efficient use of water resources** Additional DRR Information available p 159	 Pakistan	**Water Use Management Plan (WUMP)** p 169
 Haiti	**Terra Preta raised garden beds** p 175	 Haiti	**Approach at household level for Terra Preta homegardens** Additional DRR Information available p 183
		 Cambodia	**Collection, selection, breeding and dissemination of locally adapted rice varieties at the Local Agricultural Research and Extension Centre (LAREC)** in PDF
 Bangladesh	**Keyhole garden** Additional DRR Information available p 191	 Bangladesh	**Peer to peer pass-on approach with women** p 201
 Bangladesh	**Floating garden** Additional DRR Information available p 207		
 Bangladesh	**Pond Sand Filter (PSF)** in PDF		
 Niger	**Improved pearl millet variety HKP** Additional DRR Information available p 217	 Niger	**Training and awareness-raising in the use of improved agricultural techniques **** p 225
 Niger	**Improved cowpea variety (IT90k372-1-2)** in PDF		

JJ21 Würde ich für die Lesbarkeit rausnehmen.
Jana Junghardt; 27.03.2018

Technology			Approach		
DEAL WITH					
	Niger	**Multi-nutritional fodder blocks for livestock** p 231		Niger	*** links to "Training and awareness-raising in the use of improved agricultural techniques"*
	India	**Multigrain nutrient ball** Additional DRR information available p 237		India	**Eradicating malnutrition by promoting locally produced Horlicks** Additional DRR information available p 245
	Bangladesh	**Emergency infrastructure including shelter and linked transport infrastructure** Additional DRR information available p 251		Bangladesh	**Early warning message dissemination** Additional DRR information available p 263
				Cambodia	**Community safety nets – Establishment of rice seed banks at village level** Additional DRR information available p 273
				Bolivia	**Comprehensive Agrarian Risk Management (GRAI)** Additional DRR information available p 281
				Chad	**Community storage facilities** in PDF
				Chad	**Early warning system** in PDF
				Bolivia	**Creating municipal risk management units (UGR) with a participatory approach** Additional DRR information available p 289

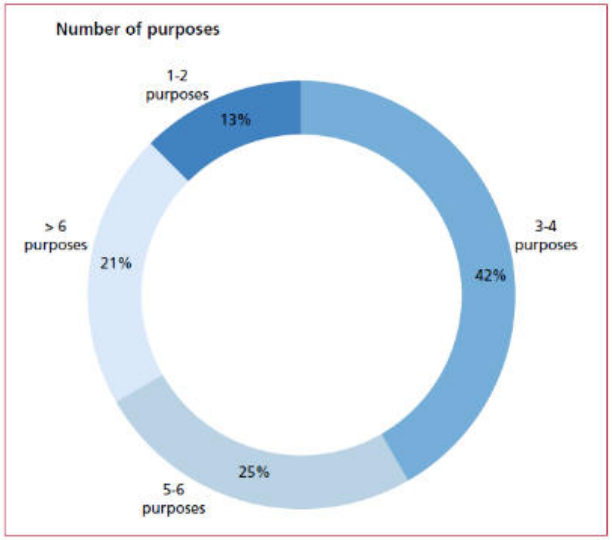
JJ23

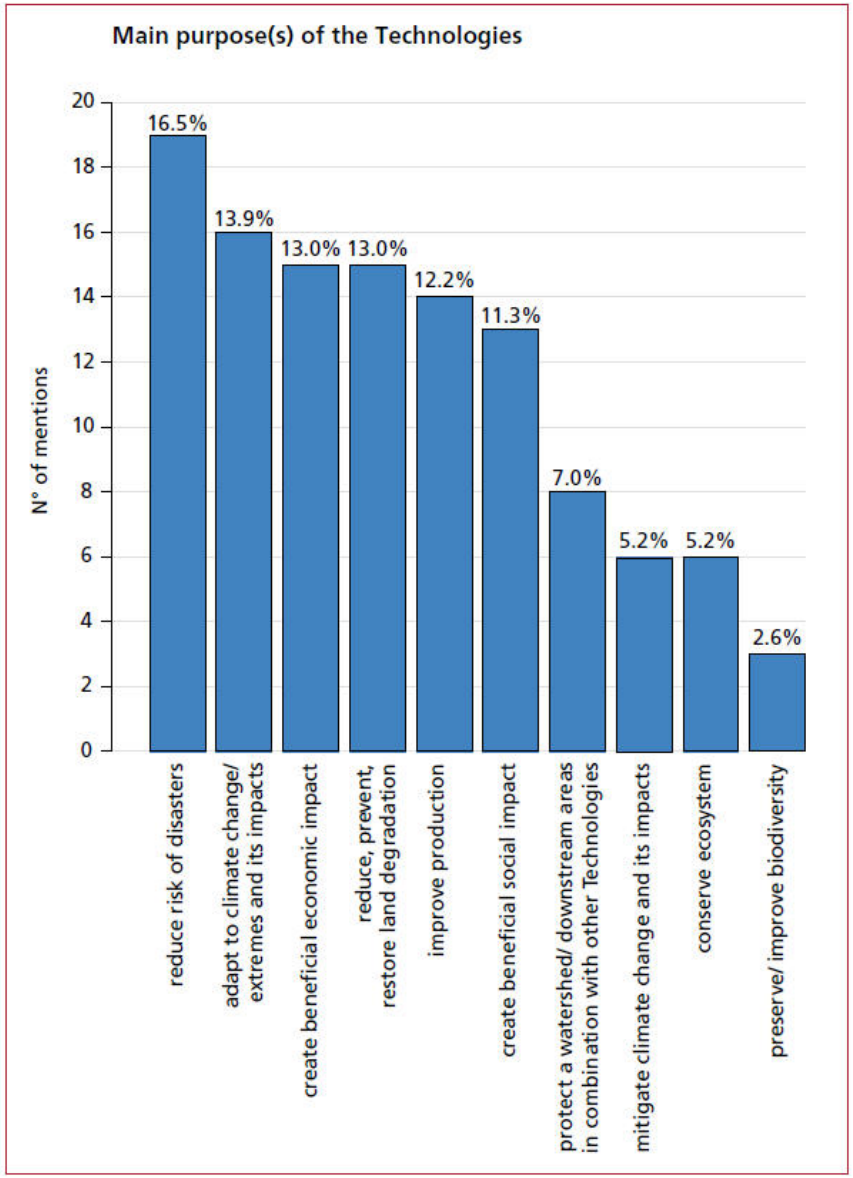
Multi-functionality of Technologies

- over 40% of Technologies with 3-4 purposes!
- addressing land degradation
- beneficial economic impact > to increase resilience
- beneficial social impact > to strengthen livelihoods of households and communities

➢ **Multi-purpose technologies beyond risk reduction**

Floating garden in Bangladesh, Helvetas





JJ23 Siehe slide "Multi-purpose character": Ins Backup.
Jana Junghardt; 27.03.2018