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DRR PLATFORM

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Learning events

- ITC in DRR
- DRR in education
- Resilience
- DRR in M4P

F2F

- Urban DRR - November 2016

http://www.drrplatform.org/index.php/events

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Tools

- Cost –benefit calculations
- Curriculum (compilation of all earning events)
- Good practice collection in WOCAT

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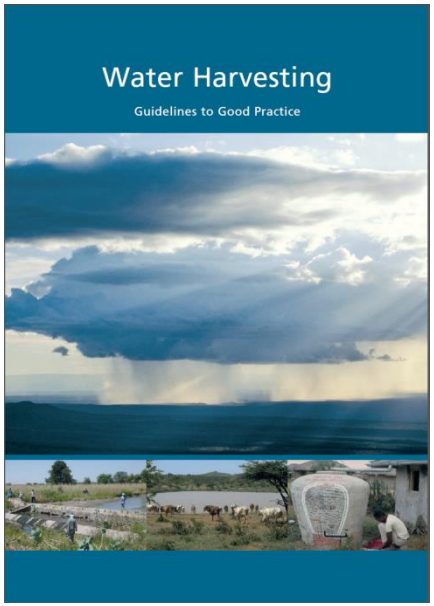
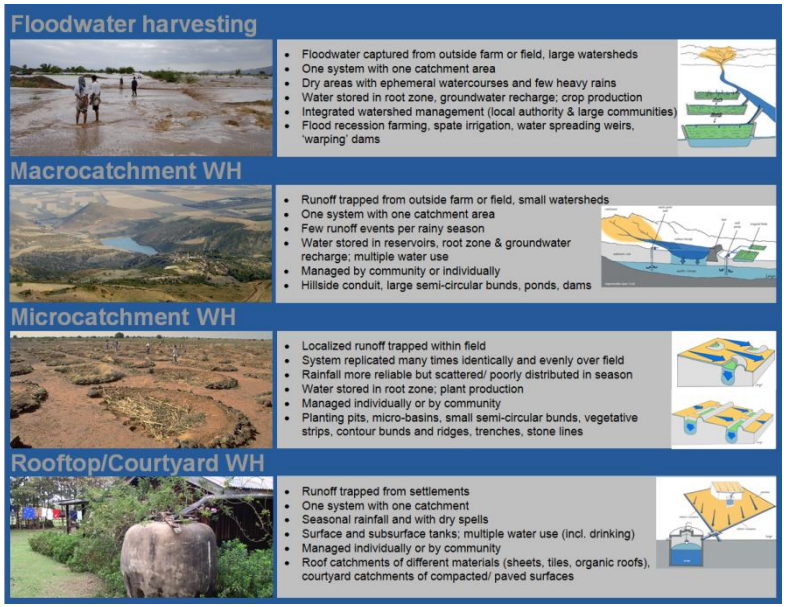
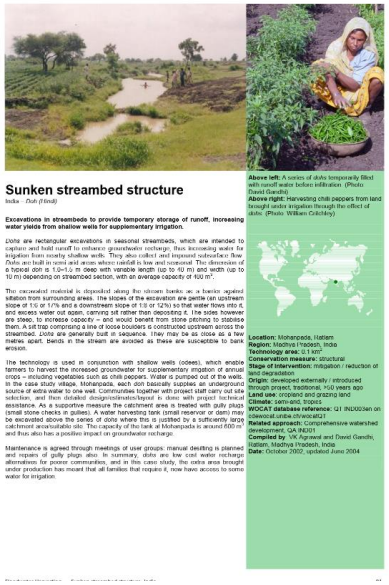
DRR – Guidelines to good practice

→ based on experiences with water harvesting book and other WOCAT publications







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PART 1

- **introduction** referring to SDGs, Sendai Framework, Hyogo Framework, UN Plan of Action on DRR …
- main **terminology and concepts** of DRR and CCA (→ based on core literature and concepts used by DRR community / Swiss NGOs) incl. tables and graphs
- **classification** system based on common frameworks (risk staircase?)
- **assessment (within and between DRR practices groups)** of suitability, adoption and up-scaling of good practices

Table 2: Major technologies under each water harvesting group

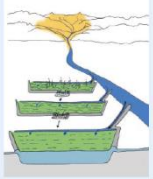
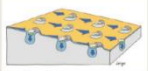
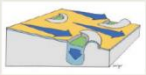
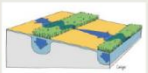
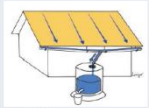
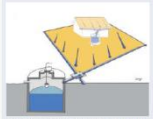
Technologies by group*	(1) Floodwater harvesting (FloodWH)	(2) Macrocatchment WH (MacroWH)	(3) Microcatchment WH (MicroWH)	(4) Rooftop and Courtyard WH (Rooftop-Courtyard WH)
	Flood recession farming; Inland valleys; Floodwater diversion, off-streambed: – spate irrigation, – floodwater spreading bunds;  Spate irrigation **Floodwater harvesting within stream bed:** – riverbed / *wadi* and gully reclamation: e.g. *jessour, tablas*, "warping" dams, – permeable rock dams Riverbed reclamation	**Water storage in soil:** – hillside runoff / conduit, – foothill reclamation: e.g. *limans*, – large semi-circular or trapezoidal bunds, – road runoff, – gully plugging / productive gullies, – cut-off drains (redirection of water); **Water storage facilities:** Surface storage: – natural depressions, – ponds and pans, – excavated ponds (e.g. *hafirs*), – cultivated reservoirs / tanks, – ponds for groundwater recharge, – surface dams: small earth and stone dams, check dams, rock catchment masonry dams; Subsurface storage: – subsurface, percolation and sand dams, – subsurface reservoirs: cisterns; Macrocatchment systems	**Pits and basins:** – small planting pits: e.g. *zaï / tassa*, – micro-basins: e.g. *negarims, meskats*, small semi-circular bunds, eyebrow terraces, mechanised Vallerani basins;  Planting pits  Semi-circular bunds **Cross-slope barriers:** – vegetative strips, – contour bunds and ridges, – tied ridges, – stone lines and bunds, – contour bench terraces (e.g. *fanya juu*), 	**Catchment:** Roofs Courtyards: – including surfaces of rock, compacted earth, sealed or paved surfaces, – plastic sheets, corrugated iron sheeting; **Storage:** – tanks, – reservoirs, – cisterns.  Rooftop WH  Courtyard WH combined with rooftop WH

Table 3

Benefits and constraints of water harvesting

Benefits	Constraints
• Securing water and productivity in dryland areas • Increasing water availability • Buffering rainfall variability • Overcoming dry spells • Harvesting plant nutrients • Helping to cope with extreme events (flooding, soil erosion, siltation etc.) • Providing an alternative to full irrigation • Offering flexibility and adaptability to suit circumstances / context and to fit budget • Reducing production risks, thus reducing vulnerability • Increasing resilience of systems • Improving access to clean and safe domestic water • Improving water availability for livestock • Reducing women's work load • Increasing food production and security • Offering the possibility of growing higher-value crops • Utilizing and improving local skills • Alleviating poverty: when adopted at scale • Reducing migration to the cities	• Dependent on the amount, seasonal distribution and variability of rainfall • Difficult to ensure sufficient quantity of water needed • Supply can be limited by storage capacity, design and costs • Structures / microcatchments may take up productive land • Ponded water can be breeding ground for mosquitos or source of waterbourne diseases • May involve high initial investments and/or labour requirements for maintenance • Jointly used structures can lead to maintenance disagreements • Shared catchments and infrastructure may create rights issues (upstream-downstream, farmers and herders) • Acceptance of new systems and associated rules and regulation may be a problem • Maintenance of communal infrastructure: built with subsidies: can be a constraint • Long-term institutional support may be necessary • May deprive downstream ecosystems of water (esp. where floodwater is diverted)

Source: Prinz,1996; Falkenmark et al., 2001; Liniger and Critchley, 2007; Rockström et al., 2007; Anderson and Burton, 2009; Liniger et al., 2011; Critchley and Gowing, 2012; Oweis et al., 2012; Scheierling et al., 2013.

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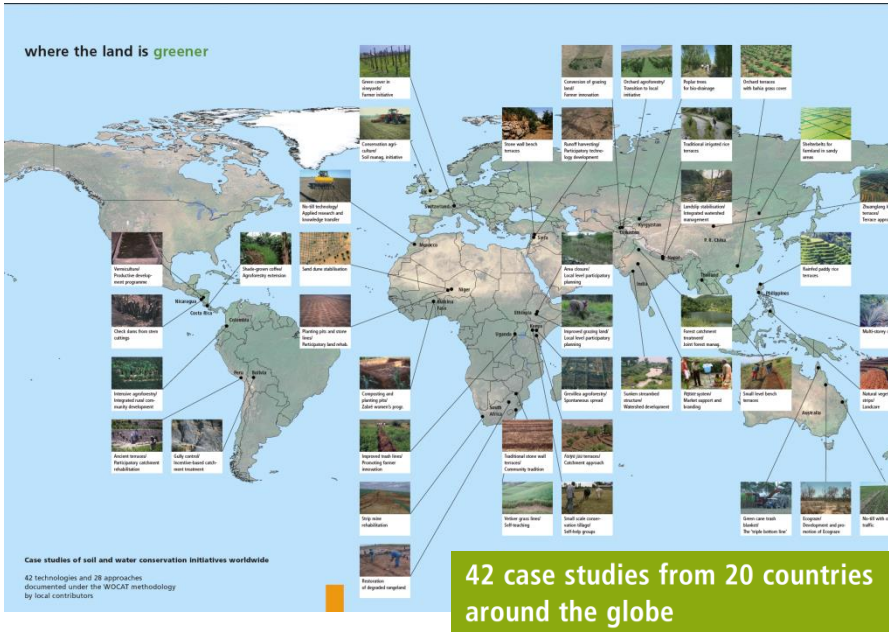
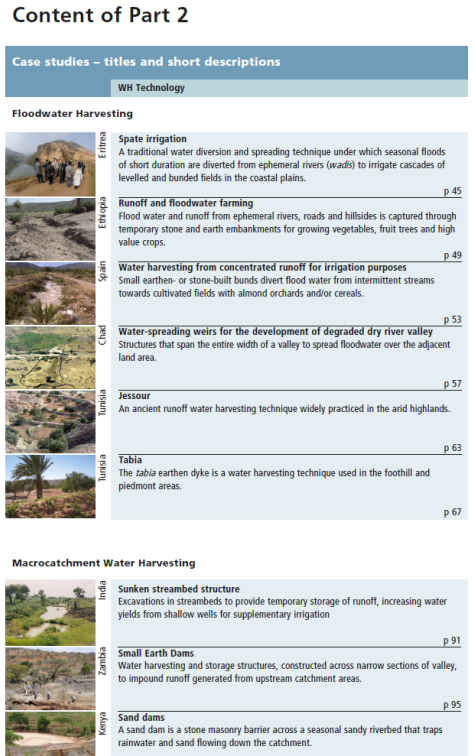
PART 2

- **30 good practices** from Swiss NGO DRR platform members grouped and presented in standardized WOCAT format
- introduction to each group of practices e.g. on economics, benefits, impacts, constraints, adoption and up-scaling





Content of Part 2

Case studies – titles and short descriptions

WH Technology

Floodwater Harvesting

Eritrea — **Spate irrigation** A traditional water diversion and spreading technique under which seasonal floods of short duration are diverted from ephemeral rivers (*wadis*) to irrigate cascades of levelled and bunded fields in the coastal plains. p 45

Ethiopia — **Runoff and floodwater farming** Flood water and runoff from ephemeral rivers, roads and hillsides is captured through temporary stone and earth embankments for growing vegetables, fruit trees and high value crops. p 49

Spain — **Water harvesting from concentrated runoff for irrigation purposes** Small earthen- or stone-built bunds divert flood water from intermittent streams towards cultivated fields with almond orchards and/or cereals. p 53

Chad — **Water-spreading weirs for the development of degraded dry river valley** Structures that span the entire width of a valley to spread floodwater over the adjacent land area. p 57

Tunisia — **Jessour** An ancient runoff water harvesting technique widely practiced in the arid highlands. p 63

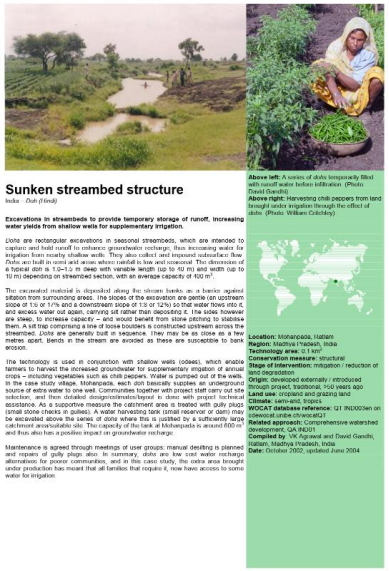
Tunisia — **Tabia** The *tabia* earthen dyke is a water harvesting technique used in the foothill and piedmont areas. p 67

Macrocatchment Water Harvesting

India — **Sunken streambed structure** Excavations in streambeds to provide temporary storage of runoff, increasing water yields from shallow wells for supplementary irrigation p 91

Zambia — **Small Earth Dams** Water harvesting and storage structures, constructed across narrow sections of valley, to impound runoff generated from upstream catchment areas. p 95

Kenya — **Sand dams** A sand dam is a stone masonry barrier across a seasonal sandy riverbed that traps rainwater and sand flowing down the catchment.



Sunken streambed structure

India - *Tula (Tank)*

Excavations in streambeds to provide temporary storage of runoff, increasing water yields from shallow wells for supplementary irrigation.

Doha are rectangular excavations in seasonal streambeds, which are intended to capture and hold runoff to enhance groundwater recharge, thus increasing water for irrigation from nearby shallow wells. They also collect and impound subsurface flow. *Doha* are built in semi arid areas where rainfall is low and seasonal. The dimension of a typical dam is 1.0–1.5 m deep with variable length (up to 40 m) and width (up to 10 m) depending on streambed section, with an average capacity of 400 m³.

The excavated material is deposited along the stream banks as a barrier against siltation from surrounding areas. The slopes of the excavation are gentle (an upstream slope of 1% or 1.7% and a downstream slope of 1.3 or 12%) so that water flows into it, and excess water out again, carrying silt rather than depositing it. The sides however are steep, to increase capacity – and would benefit from stone pitching to stabilise them. A silt trap comprising a line of loose boulders is constructed upstream across the streambed. *Doha* are generally built in sequence. They may be as close as a few metres apart. Bends in the stream are avoided as these are susceptible to bank erosion.

The technology is used in conjunction with shallow wells (*dobes*), which enable farmers to harvest the increased groundwater for supplementary irrigation of annual crops – including vegetables such as chilli peppers. Water is pumped out of the wells. In the case study village, Mohanpada, each *doh* basically supplies an underground source of extra water to one well. Communities together with project staff carry out site selection, and then detailed design/mistakes/layout is done with project technical assistance. As a supportive measure the catchment area is treated with gully plugs (small stone checks in gullies). A water harvesting tank (small reservoir or dam) may be excavated above the series of *doha* where this is justified by a sufficiently large catchment area/suitable site. The capacity of the tank at Mohanpada is around 600 m³ and thus also has a positive impact on groundwater recharge.

Maintenance is agreed through meetings of user groups: manual desilting is planned and repairs of gully plugs also. In summary, *doha* are low cost water recharge alternatives for poorer communities, and in this case study, the extra area brought under production has meant that all families that require it, now have access to some water for irrigation.

Above left: A series of *doha* temporarily filled with runoff water before infiltration (Photo: David Gandhi)
Above right: Harvesting chilli peppers from land brought under irrigation through the effect of *doha* (Photo: William Critchley)

Location: Mohanpada, Hatiam
Region: Madhya Pradesh, India
Technology area: 0.1 km²
Conservation measure: structural
Stage of intervention: mitigation / reduction of land degradation
Origin: developed externally / introduced through project, traditional, 100 years ago
Land use: cropland and grazing land
Climate: semi-arid, tropics
WOCAT database reference: QT IND003en on cdewocat.unibe.ch/wocatQT
Related approach: Comprehensive watershed development, QA IND01
Compiled by: VK Agrawal and David Gandhi, Hatiam, Madhya Pradesh, India
Date: October 2002, updated June 2004