JONAS BERKING

WATER HARVESTING AND WATER MANAGEMENT-

CLASSIFICATIONS AND EXAMPLES

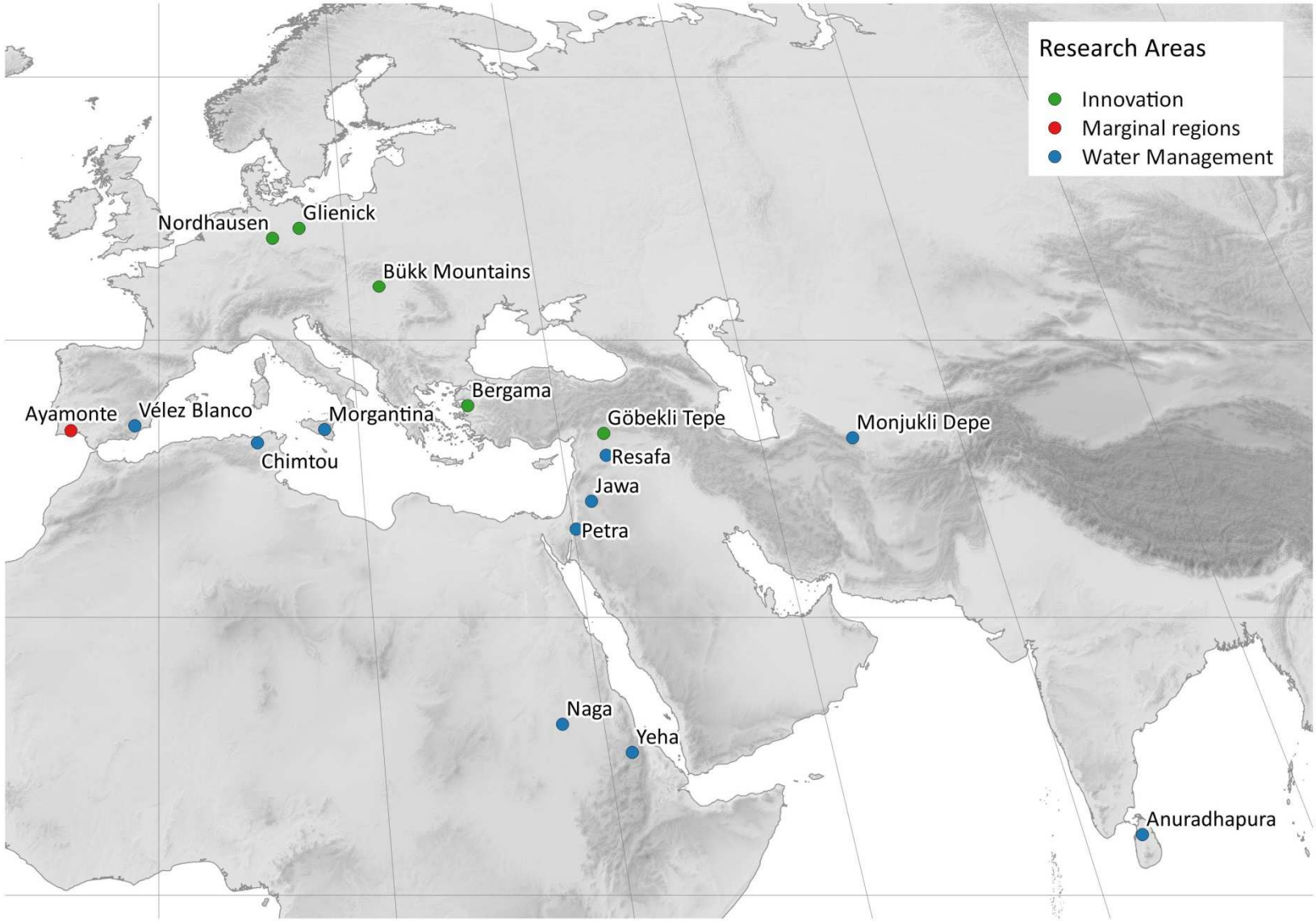
Junior Research Group „Watermanagement“ in the Cluster of Excellence TOPOI

Freie Universität Berlin

1. Water Harvesting an Introduction and Classification
2. Water Management – the concept of the Topoi Group
3. Water Harvesting, a historical example from Naga, Sudan

EXCELLENCE CLUSTER TOPOI

Landscape archaeological projects at the Freie Universität Berlin

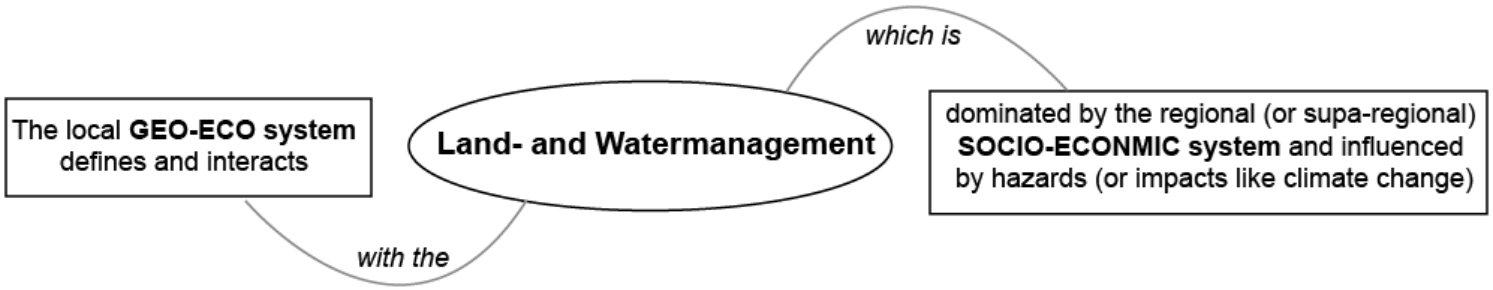


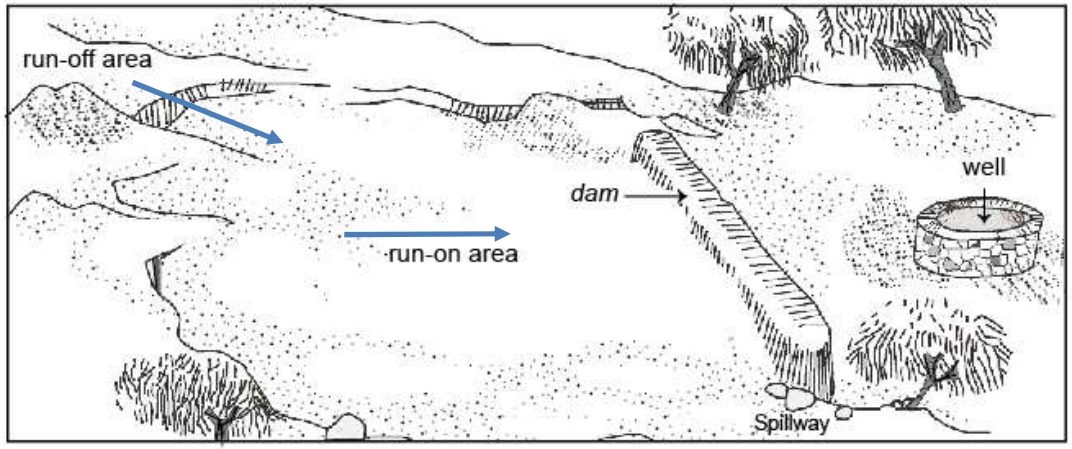
DEFINITION

Water harvesting is the collection of runoff for productive purposes.

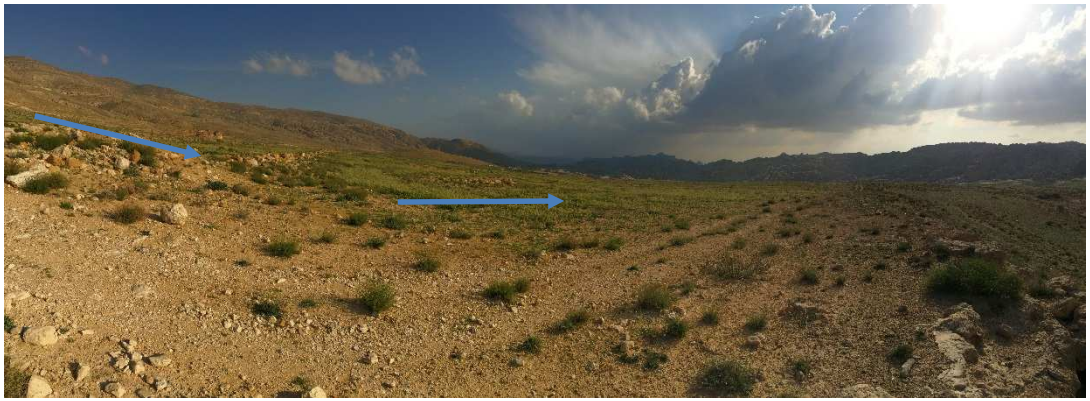
Critchley and Siegert (1991)

BACKGROUND



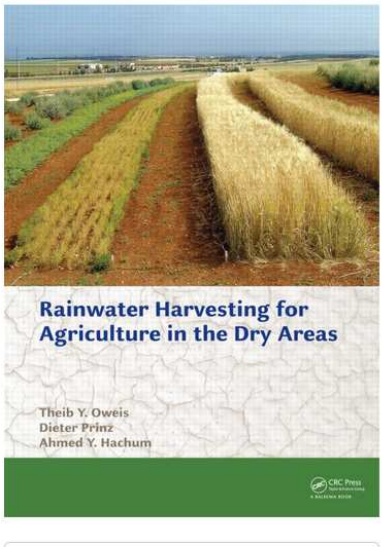


Water Harvesting, priciple
(after Maechtle, 2012)

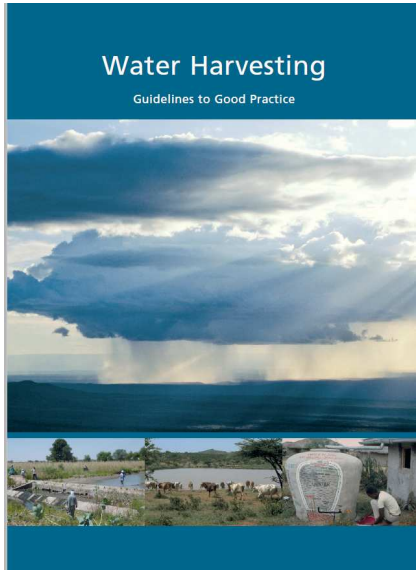


Abandond terraces,
hinterland of Petra, Jordan

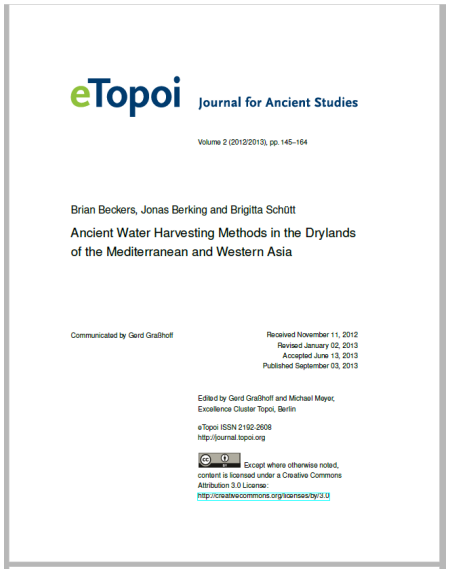
Sources for Water Harvesting classifications



Oweis et al. 2012



Wocat 2013



Beckers et al. 2013

Water Harvesting classifications

1 SCALE Oweis et al. 2012

Size of harvested area (CCR run-off vs run-on area)

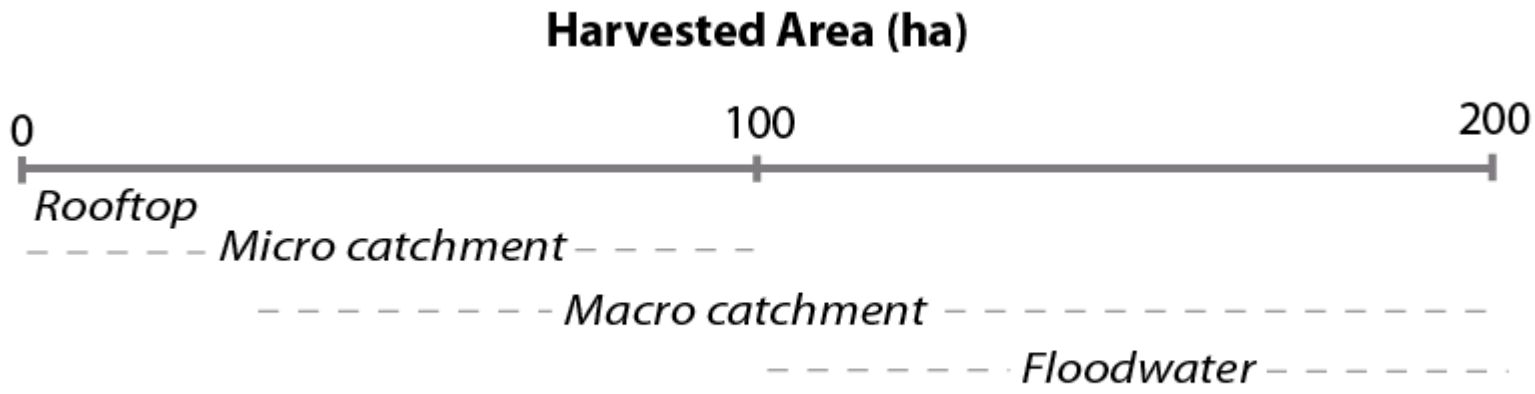
Micro, Meso, Macro

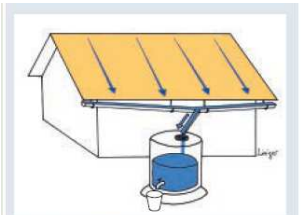
Local, Regional, Supra-Regional

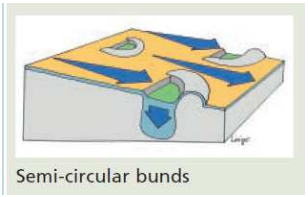
2 TYPE OF WATER SOURCE Beckers et al. 2013

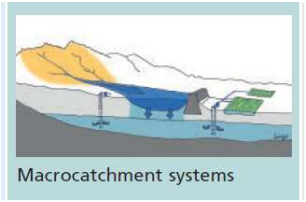
Autogenic, Allogenic

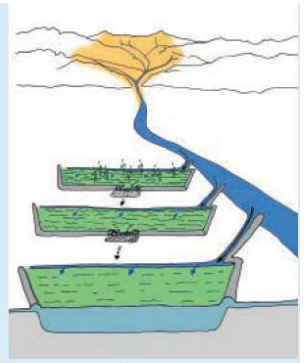
Precipitation, Surface Runoff, Groundwater




Rooftop WH


Semi-circular bunds


Macrocatchment systems


Spate irrigation

after Oweis et al. 2012 and Wocat 2013

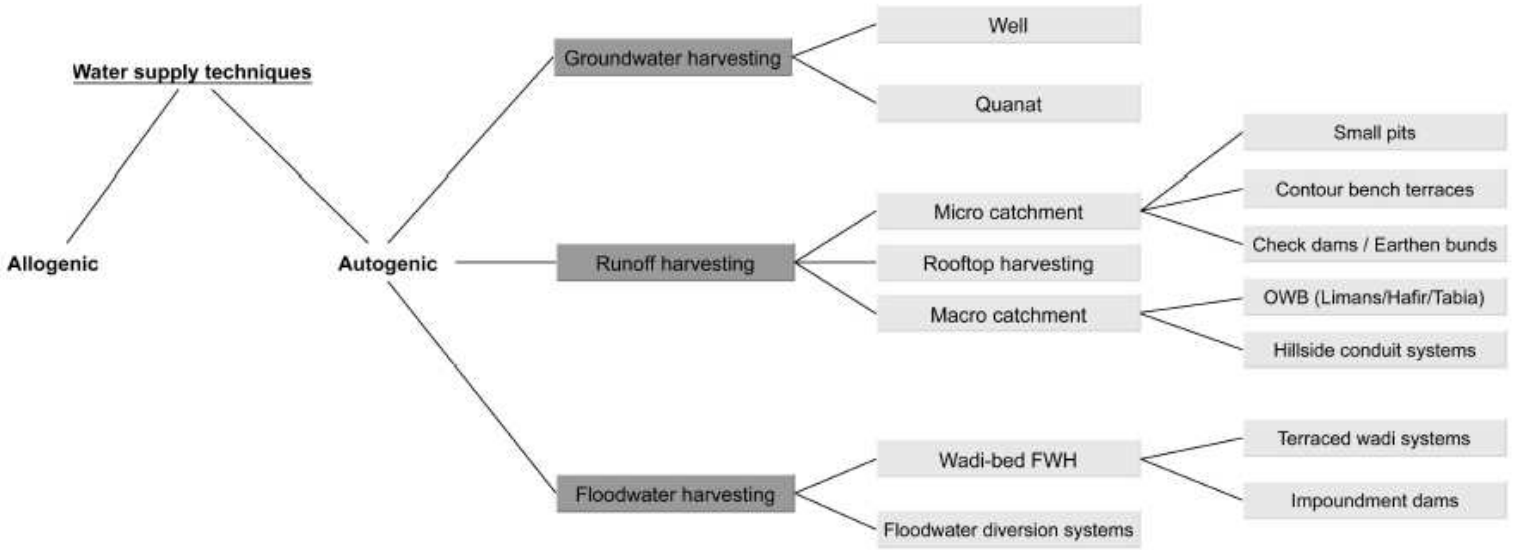
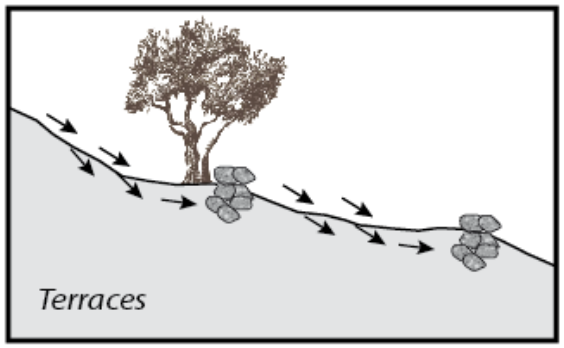
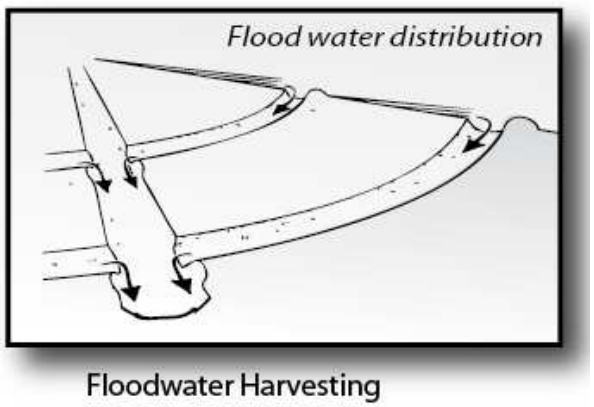


Fig. 1 | Classification of the aforementioned water harvesting systems. OWB: Open water basins; FWH: Flood water harvesting.

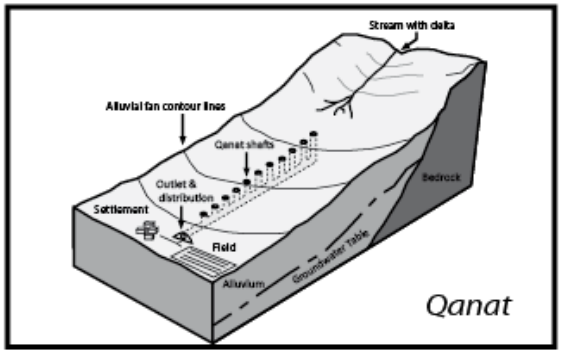
Beckers et al. 2013



Rainfall Runoff Harvesting



Floodwater Harvesting



Groundwater Harvesting

Agricultural Terrace,
NE Andalusia, Spain

Floodwater Harvesting,
Rio Ica, SW Peru

Qanat shafts,
SW Turkmenistan

Other means of Water Harvesting classifications/ assessment?

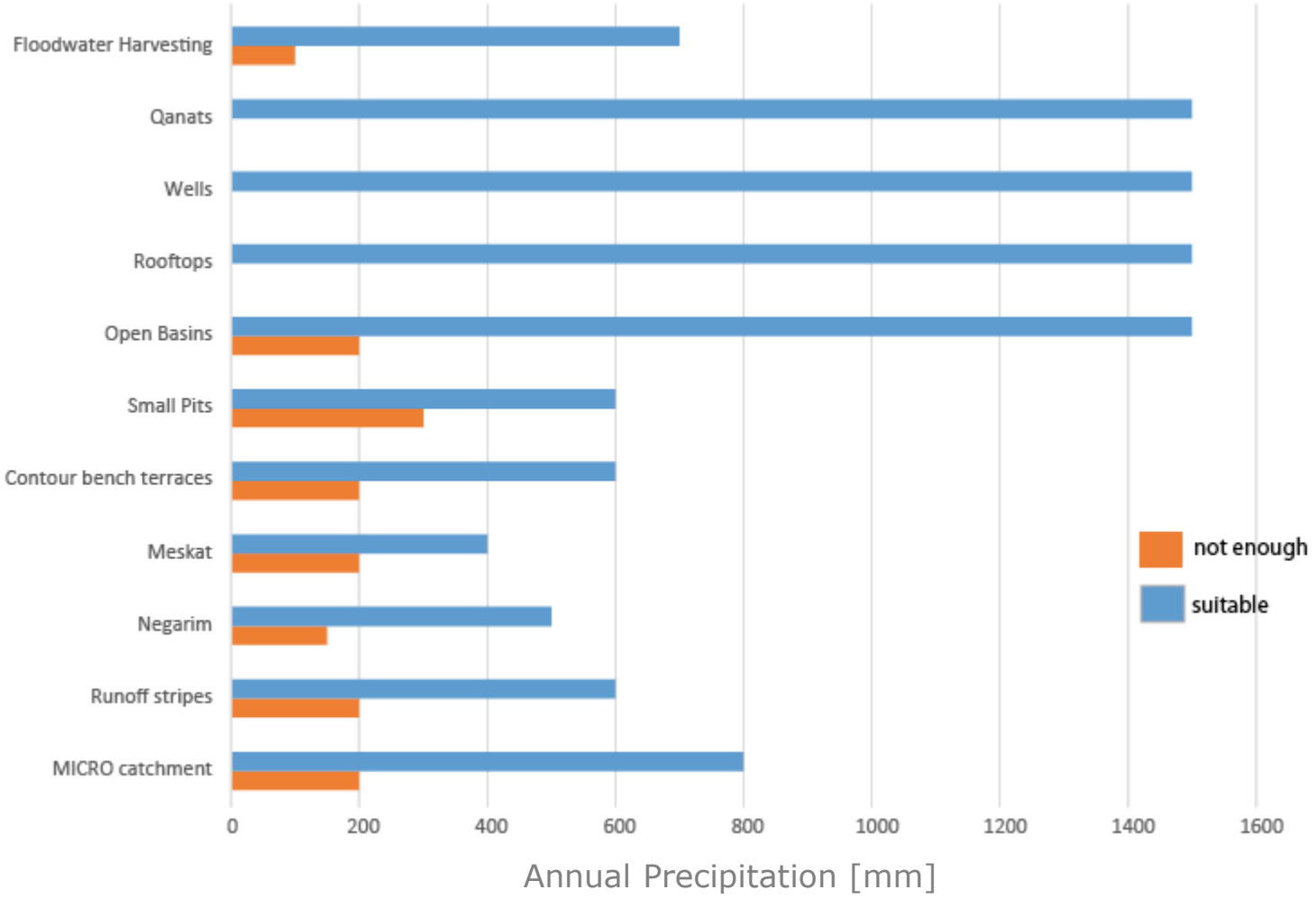
Annual Precipitation?

Costs?

Benefits?

Maintenance?

Persistence/ Adaptation?



data from Oweis et al. 2012 and Wocat 2013

		Labor requirement	Know How: Maintenance	Know How: Construction	Risk reduction
Runoff Harvesting	Micro Catchment	++	+	+	**+++**
Runoff Harvesting	Macro catchment	**+++**	++	++	**+++**
Runoff Harvesting	Rooftop	+	+	+	++
Floodwater Harvesting	Floodwater diversion	**+++**	++	**+++**	++
Groundwater Harvesting	Well	+	+	+	+
Groundwater Harvesting	Qanat	**+++**	+	++	+

+++ high
++ med
+ low

PROs
Increased resilience, less conflicts, conserved ecosystems

- Securing water and productivity in dryland areas in a sustainable manner
- Buffering rainfall variability and increasing water availability
- Overcoming dry spells
- Helping to cope with extreme events (flooding, soil erosion, siltation etc.)
- improving and conserving soil development and fertility
- Increasing resilience of systems
- Increasing food production and security
- Utilizing and improving local skills
- Alleviating poverty: when adopted at scale
- Reducing migration to the cities
- Possible Conflict reduction, and improved indecency
- Groundwater replenishment contra vise over usage
- …

CONs
High costs of labor and management

- Gamble for rainfall in areas with highest variabilities
- Difficult to ensure sufficient quantity of water needed
- Supply can be limited by storage capacity, design and costs
- Ponded water can be breeding ground for mosquitos or source of waterborne diseases
- May involve high initial investments and/or labor requirements for maintenance
- Jointly used structures can lead to maintenance disagreements
- Shared catchments and infrastructure may create rights issues or conflicts (upstream-downstream, farmers and herders, land ownership)
- Long-term institutional support may be necessary to be controversial due to problems of high costs, mismanagement, damaged ecosystems, limited water resources
- …