

ICARDA Experience in Managing Degraded Lands in Dry Areas

Abdul Majid

&

Muhammad Ashraf



International Center for Agricultural Research in the Dry Areas

About ICARDA

ONE OF 15 CGIAR CENTERS (CONSULTATIVE GROUP ON
INTERNATIONAL AGRICULTURAL RESEARCH)

Vision:

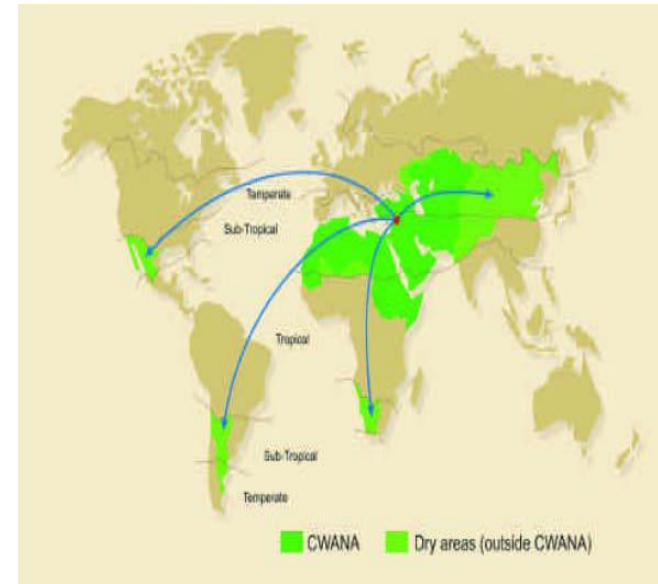
**Improved livelihoods of the resource-poor in the
dry areas**

Geographic Mandate:

Non tropical dry areas

Partners:

- **National Agricultural Research and Extension Systems (NARES)**
- **Advanced Research Institutes**
- **Development organizations, and Rural communities**



ICARDA Research Program

The research portfolio of the Center is built on four major research programs with supporting cross-cutting service units.

The four research programs are:

- Biodiversity and Integrated Gene Management.**
- Integrated Water and Land Management.**
- Diversification and Sustainable Intensification of Production Systems.**
- Social, Economic and Policy Research.**

Technologies for different dryland conditions

- Technologies for drier environments (100-200 mm)
- Technologies in rainfed cropping environments (200 to 400 mm)
- Technologies in wetter parts of the rainfed environments (400-800 mm)



Technologies for drier environments (100-200 mm)

**Micro-catchment water harvesting systems
can help capture and concentrate surface
runoff flows**

Contour ridges



Intermittent pits



Technologies in rainfed cropping environments (200 to 400 mm)

Water harvesting and soil and water conservation technologies for drought tolerant fruit trees and crops (e.g., olive, almond, pistachio)



Technologies in wetter parts of the rainfed environments (400-800 mm)

- Micro catchment for soil and moisture conservation
- Low-cost terrace outlet structures to conserve moisture and control erosion
- Supplemental irrigation



Stone Bunds and Terraces



Continuous along the contour



Semi-circular around the trees

Cultivation of cover crops, such as vetch, in between the trees



Watershed Activities in Pakistan

Approach

- Research site to watershed
- Piecemeal to system
- Individual farmer to community

Components

- Development of COs/WA and watershed characterization
- Applied research
- Capacity building

WATERSHED PROJECT ACTIVITIES

Dhoke Mohri Community

- Evaluation of terrace-gully system management at sub-watershed

Ratta Community

- Olive Plot
- Weather station
- Runoff and

Rehna Sadaat Community

- Runoff and soil loss monitoring system
- Rainfed terraced sub-watershed systems
- Runoff harvesting.
- Rehabilitation of wasteland/ gullied areas
- Crop water productivity trial on groundnut, Wheat, corinder, chillies, and fodder in Rehnasadat and Murid area

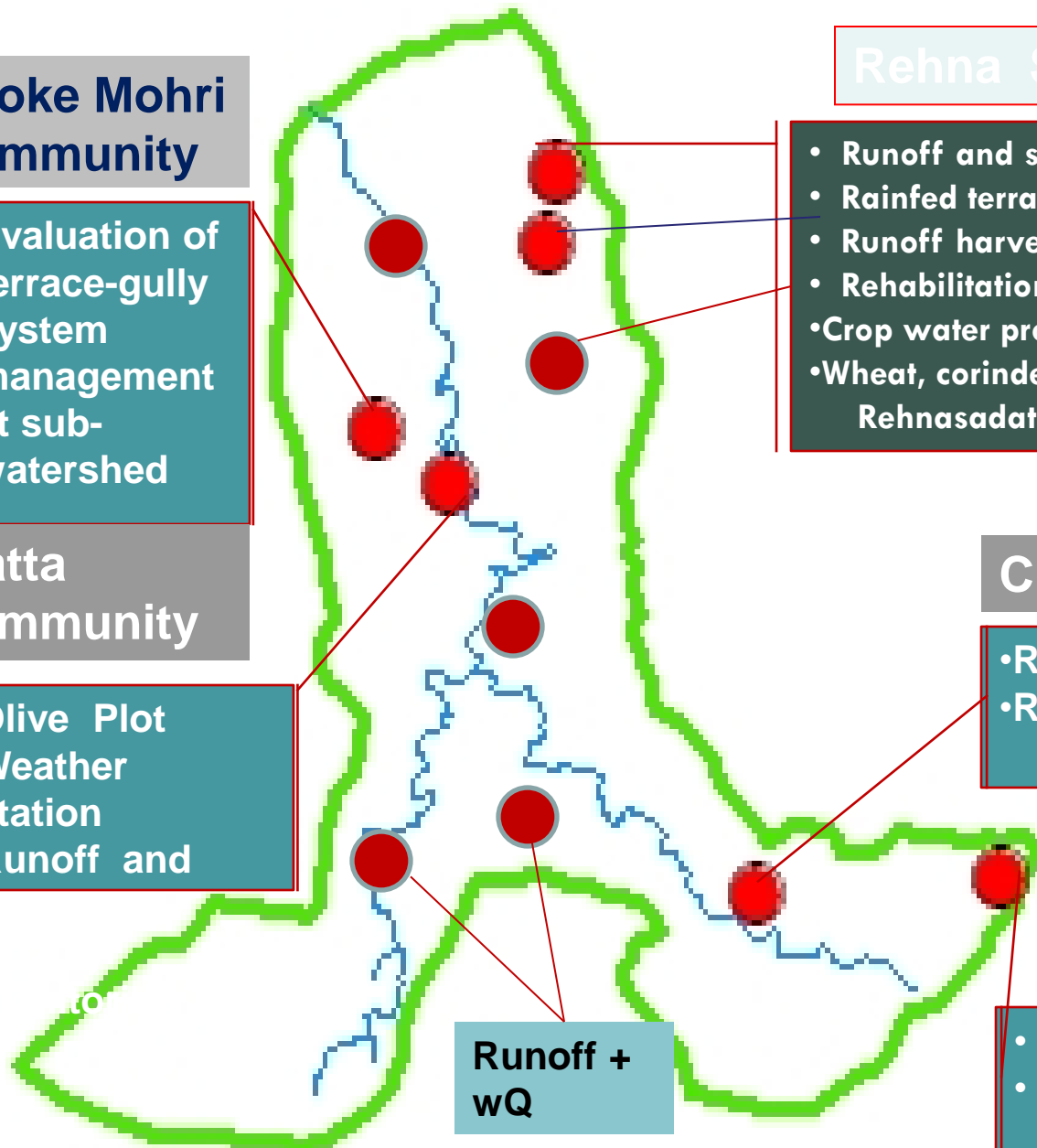
Chak Khushi Community

- Rainfed terraced sub-watershed sy
- Rehabilitation of wasteland

Khokharbala Community

- Gully Farming
- Rehabilitation of wasteland

Runoff +
wQ



Erosion control structures

ISSUES:

- Damage to terraces with high intensity rainstorms
- Loss of soil and water

CONSEQUENCES:

- Loss of water -Reduced moisture for crops.
- Loss of fertile surface soil layer - reduced soil productivity.
- Additional expenses to make embankments & minor leveling

OBJECTIVES:

- Safe disposal of surplus rainwater from higher field to the lower
- Improvement of soil-moisture and
- Prevention of soil losses

Traditional Technology



Low Cost Structures with Communities:



Growing fruit plants in gullied/eroded areas

TRADITIONAL TECHNOLOGY:

- Indiscriminate Land leveling

CONSEQUENCES:

- Top fertile soil buried
- More prone to erosion
- Huge expenditure

Objective:

To study the possibility of growing fruit plants

- Without leveling
- Utilization of rainwater for raising high value crops
- Minimizing soil and water losses

Water harvesting techniques in the watershed



Improving Floodwater Harvesting Techniques- Balochistan

- Half catchments and half crop area (1:1) produced 63% more grain yield than farmer practice.



Evaluation of different irrigation techniques for fruit plants

- **Flood irrigation**
- **Border irrigation**
- **Basin irrigation connected through channels**
- **Micro sprinkler irrigation**
- **Buried stone pocket irrigation**
- **Spiral pipe irrigation**
- **Trickle/drip irrigation**
- **Bubbler irrigation**

Irrigation methods





Spiral Pipe



Bubbler



Micro Sprinkler



Trickle/drip

Water use and plant data

S.No .	Irrigation Techniques	Water used/ Plant (m ³) Excluding rainfall	Water receive d / plant through rainfall (m3)	Total Water use / plant (m3)	Plant height (m)	Plant canopy (m)
1	Flood irrigation	36.3	4.9	41.2	2.16	9.40
2	Border irrigation	17.2	3.6	20.8	1.95	7.76
3	Basin irrigation connected through channels	11.3	3.5	14.8	1.95	7.22
4	Micro sprinkler irrigation	6.0	3.6	9.6	1.95	7.96
5	Buried stone pocket irrigation	2.8	3.9	6.8	2.04	7.85
6	Spiral pipe irrigation	4.9	4.0	8.9	1.77	7.98
7	Trickle/drip irrigation	5.6	3.9	9.5	1.86	7.94
8	Bubbler irrigation	7.2	4.0	11.2	1.97	8.10

Supplemental Irrigation

With only 13% extra cost of water on supplemental irrigation, the wheat yield was improved by 47%, water productivity by 23% and net income by 55% as compared to the farmer's practices.



IMPROVING FEED FOR SMALL RUMINANTS



Introduction of Improved Fodder Crops

Punjab:

- Improved variety of Guar (BR-99) as hay for lean period.
- Improved varieties of Oats and Barley (for winter and lean period)
- Multi-cut varieties of Berseem (phachaiti) and Alfa alfa (Sargodha 2002)

Balochistan:

Improved varieties of Barley (Awaran), Maize (Azam) and Alfa alfa (Super, SG Long, Trifecta).

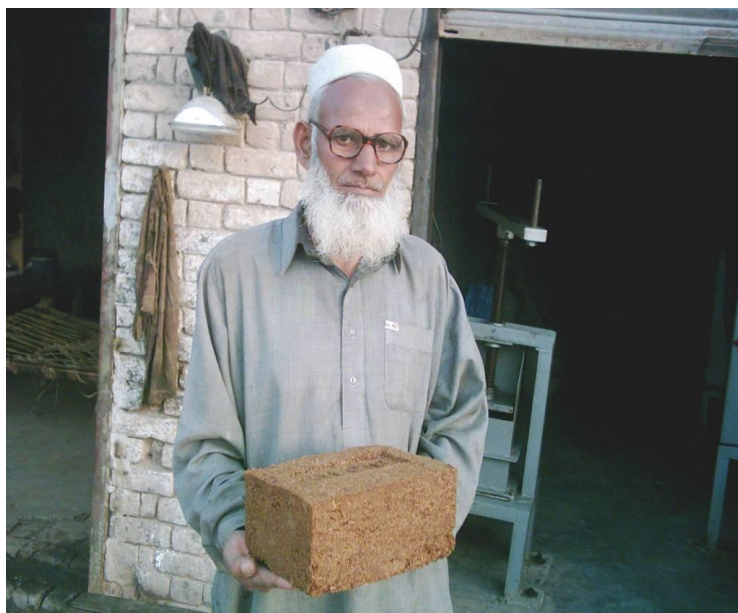
Supplemental feeding for milk and meat production:

- Supplemental feeding increased milk production from 30 to 51 litters in 9 weeks.
- Average per day weight gain was increased from 113 to 170g.



Mix feed and Urea Mineral Molasses Blocks:

- The average milk yield increased by 1.5 liters/day/animal in buffaloes with mix feed.
- The cost of balanced feed was Rs.100 less than traditionally used cotton seed cake.
- Urea Mineral Molasses Blocks showed cost benefit ratio of 1:5 and in cattle 1:3 when these trials were conducted.
- Based on these results, small enterprises established to evaluate their performance for production and selling urea molasses blocks and mix feed.



Thanks

