Ecosystem Restoration to Secure Water and Food in the Arid Areas in Jordan: Tal Remah Case study

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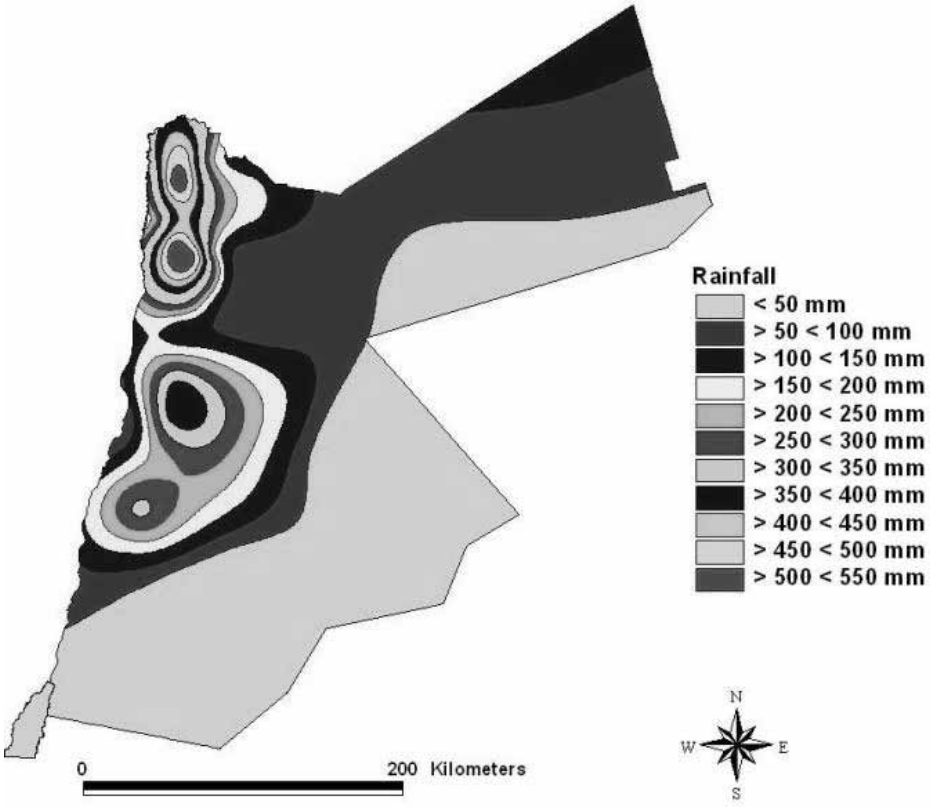
Challenges:

- Dry area
- Water is rare
- Food security is a concern
- Sustainability of our ecosystem is threatened

Precipitation Map of Jordan



Constraints for Food Security:

- Degraded ecosystems
- Arid lands with high salinity
- Low productivity
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- Water is rare
- High unemployment rate
- Remote communities with little services
- Livestock industry is mainly sheep

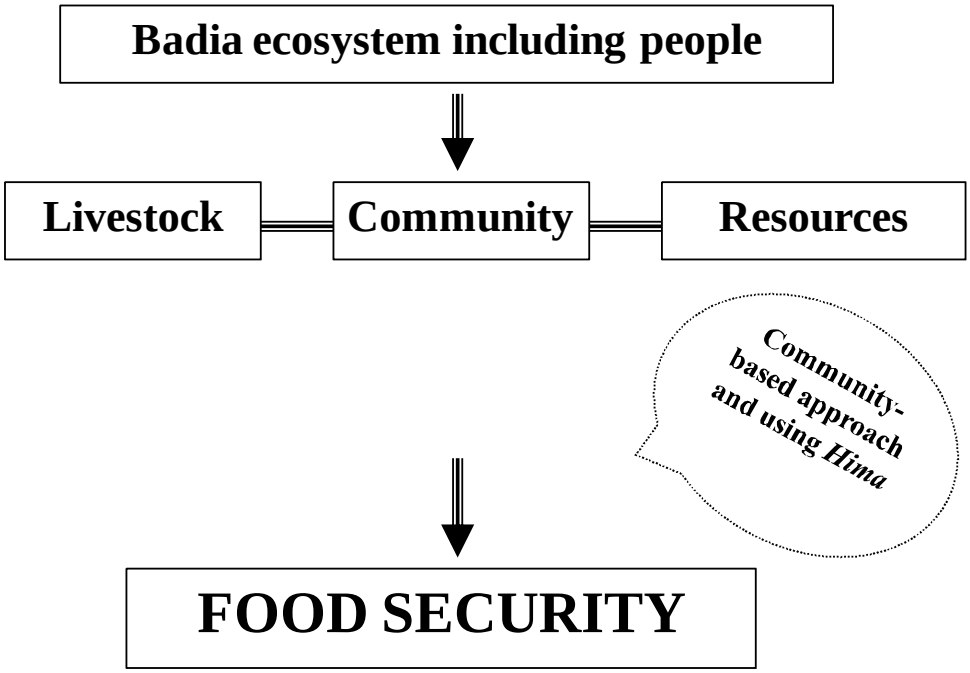
Constraints related to Water:

- Low rainfall (less than 200mm)
- High Evaporation
- Run-off (flash floods)
- Biomass decline resulting from:
- Overgrazing
- Continues drought years
- Soil erosion and mass movement
- Resources degradation: habitat and eco-system are under threat such as caracal Gazelle and desert wolf and hyena etc..

There is a need to:

- Conduct critical, rigorous and relevant research which will contribute to provide the policy makers with the appropriate recommendations to develop long-term national policies for better water use and economically efficient food production.

ACHIEVING FOOD SECURITY APPROACH



Community-based approach and using Hima

- Ecological restoration of the Badia ecosystem with full participation of the local communities:
- Apply the Hima concept to restore, manage and monitor the ecosystem
- Proper management and careful attention to the amount of water that flows off the targeted ecosystem.

Community Participation

The local community to be involved in projects from the starting point of problem definition, possible solutions, site selection, water harvesting techniques, and selection of plant species suitable to the area and the intended use by livestock owners.

Hima

Tall Remah Case Study

- **Sustainable, productive use of the range resources.**
- **Better water management**
- **Improved socio-economic conditions for livestock owners.**
- **Enhanced local capacity to manage and preserve a productive ecosystem.**
- **Increased biodiversity and stability of rangeland ecosystems.**

FOOD SECURITY

But first situation analysis: Baseline survey involving the local community

Tall Rimah Area

- Gently undulating with scattered hills
- Arid climate
- The annual rainfall less than 200 mm (Oct-March).
- January: 13 ºC and 3 ºC,
- August: 33 ºC and 17 ºC

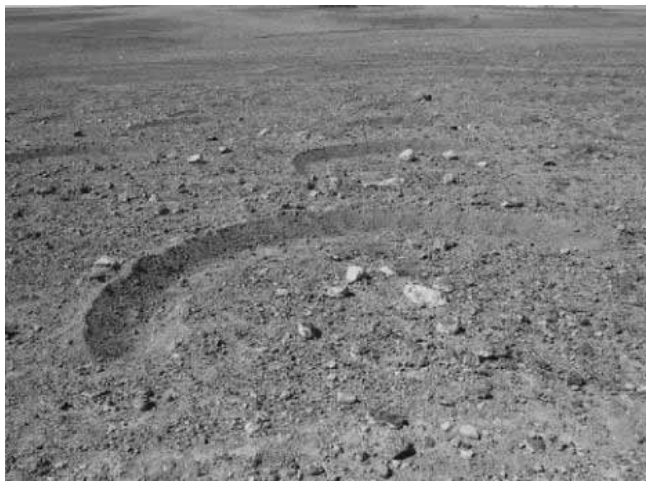
Productivity

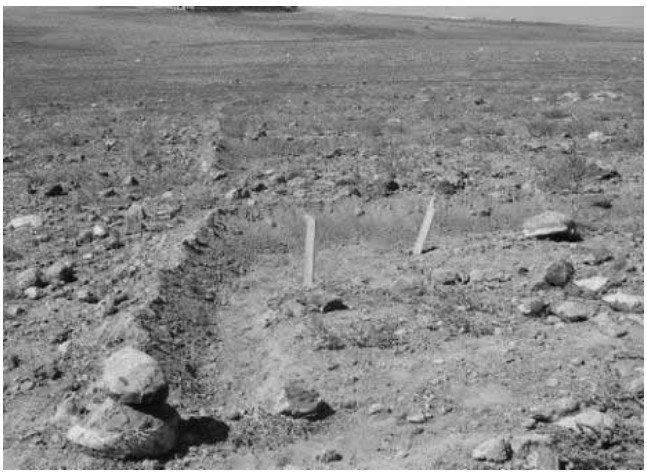
Site	Site Total Area ha	Total forage	Total Available Forage kg	Grazing Capacity for 3 Months
1	447	10236.3	5118.15	32
2	74	2344	1172	7
3	63.47	12402	6201	38
4	319.31	37423	18711.5	116
5	486.65	15913	7956.5	49
6	857.75	6776	3388	20
7	847.63	41110	20555	127
8	847.63	8671	4335.5	26.76
9	506	53130	26565	164
10	396	44	22	0.14
11	20	78	39	0.24
12	135	68	34	0.21
12	61	1124	562	3.

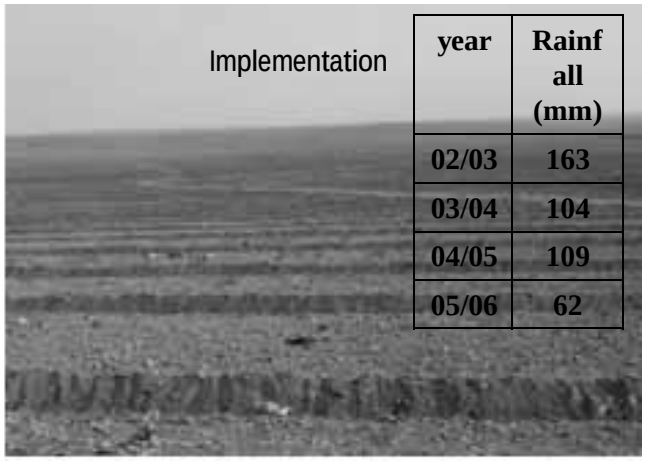
Methodology: Water Harvesting Techniques

Implemented different water harvesting techniques:

1. Contour furrows
2. V-Shape
3. Crescent Shape
4. Low rock wall







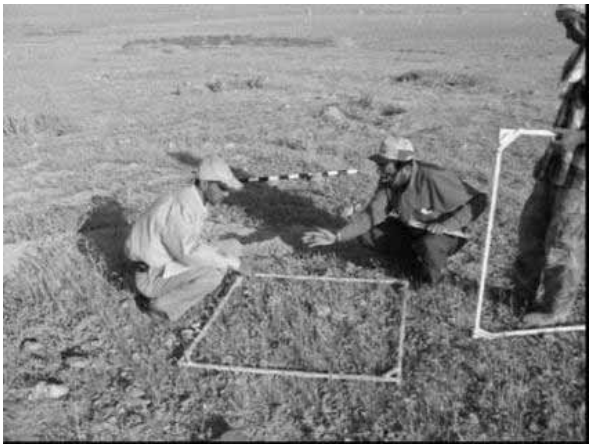
year	Rainfall (mm)
02/03	163
03/04	104
04/05	109
05/06	62

Methodology: Plant Species

1. *Atriplex nummularia*
2. *Atriplex halimus*
3. *Salsola Vermuclatea*

Monitoring and Evaluation

- **Shrubs survival rate**
- **Plant survey**
- **Biomass Production of Shrubs**
- **Evaluation of Water Harvesting Techniques**
- **Precipitation Monitoring**
- **Social Acceptance**



FOOD SECURITY

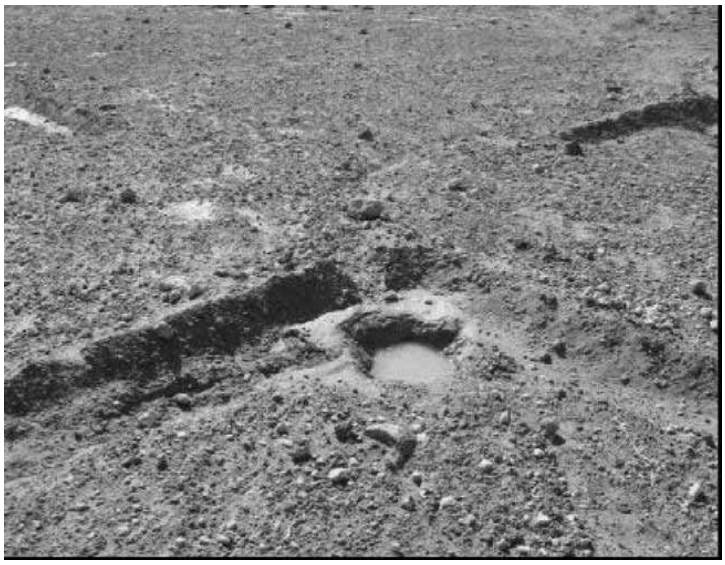
RESULTS

Retention of Runoff and Storage of Soil Water for Plants:

- Good indication of the effectiveness of the contour furrows and micros in retaining runoff
- Contour furrows performed better than micros in terms of resistance to breaching by heavy accumulations of runoff.

Stability of Structures

The crescent-shaped and chevron-shaped micros performed well after initial breaching was repaired. Forty percent of the structures were breaching during the first year.



Survival Rate of Planted Shrubs

Four years from planting the average survival rate for all three shrub species was 88 percent. This is classified as excellent result. The shrubs were adapted to the area, and the water harvesting techniques worked well in producing this result.

Results and Indications

- Recovery of species (from 21 to 54) during 4 years.
- Recorded recovery of two important species (Crocus and Desert Iris). These species are very sensitive environmentally.
- The current biomass production in the reserve is 0.5 Ton dry matter per Ha, compared to 0.02 Ton dry mater per Ha in the grazed zone.
- Expectations: most probably there will be a higher rate in intensity, frequency and productivity in the next years.
- This demonstration research will be an incentives for other communities to copy as an example.

Biomass production of shrubs Kg dry matter (DM)

	Estimated Biomass from Year 2003 to 2006 Kg DM/ha				
Plant Species	Water Harvesting Techniques	2003	2004	2005	2006
Atriplex halimus	Contour Furrows	23	196	345	395
Atriplex halimus	Crescent Shape	15	186	279	260
Atriplex halimus	V - Shape	15	133	258	332
Mean		18	172	294	329
Atriplex nummularia	Contour Furrows	24	245	370	452
Atriplex nummularia	Crescent Shape	21	209	314	341
Atriplex nummularia	V - Shape	24	151	306	319
Mean		23	202	330	371
Salaola vermuclatea	Contour Furrows	6	22	45	77
Salaola vermuclatea	Crescent Shape	5	20	61	60
Salaola vermuclatea	V - Shape	5	14	34	49
Mean		5	19	47	62

Impact on Food Security

- Improvement of the Ecosystem
- Secure the required amount of water for the rehabilitation of the rangeland site.
- Secure forage for livestock up to three months
- Reduce production cost
- Increase productivity- milk and meat (food security)

Project Site: Tal Rimah

Crocus moabiticus

Iris aucheri

Conclusions

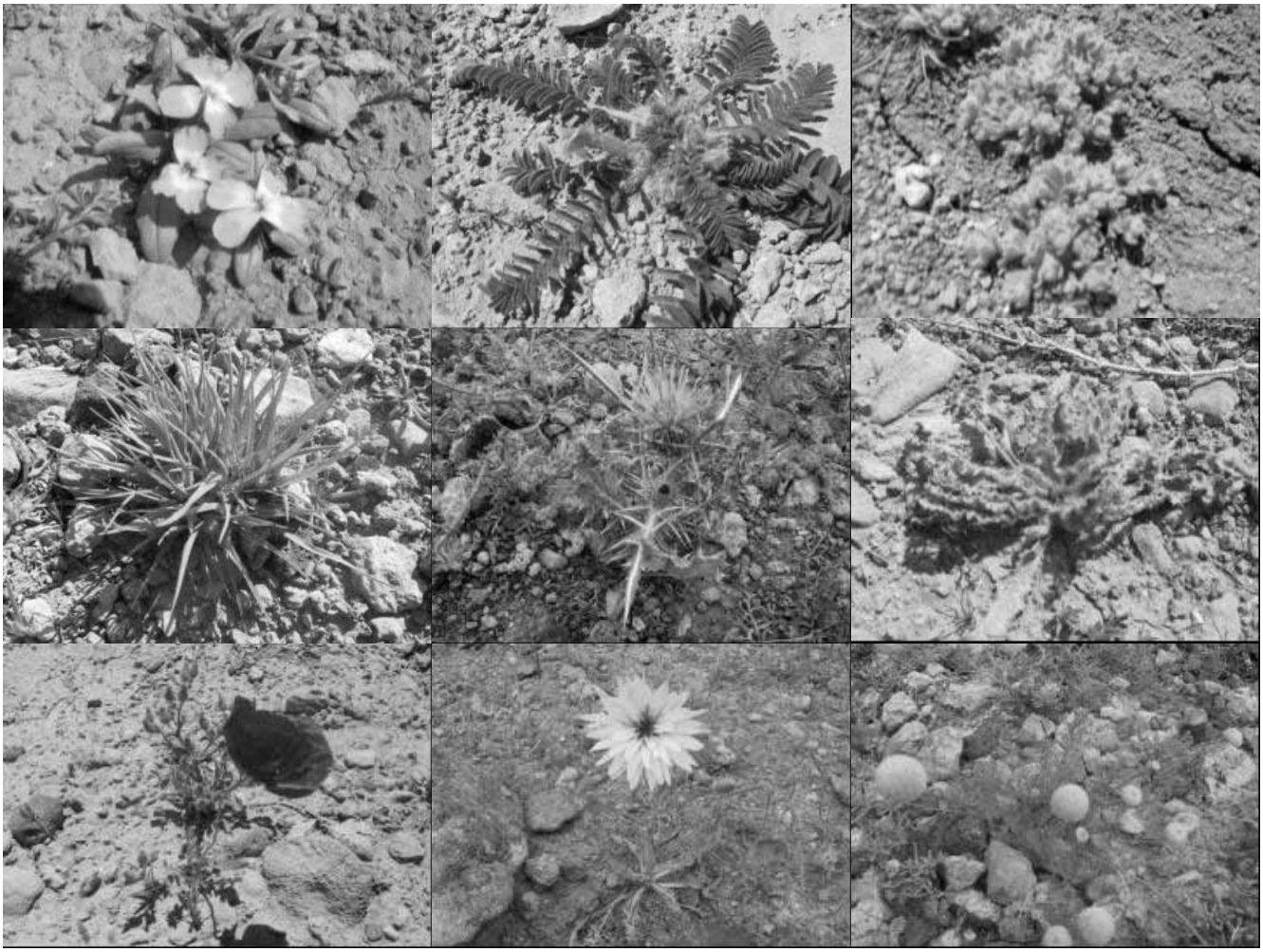
- **Hima and water harvesting techniques (micro-catchments) are good tools to secure water and food security.**
- **The project has been able to demonstrate to the government that, with the cooperation of the local Bedu population, securing water and food security in arid lands is possible.**
- **Relation between research centres and implementing institutions needs to be modified.**
- **It has also shown the necessity of urgently addressing the issues associated with free access to all areas of land, the effects of drought and the need for preparing drought contingency plans.**

Conclusions

- **It is important to disseminate information to all interested parties, including regional bodies.**

- **Even with little rain, it is possible to secure water and food by 'proper management and careful attention to the amount of water that flows off the targeted ecosystem'.**

- **The main lessons learned were both technical and socio-economic and it is clear that they must be considered together in water and food security development programmes.**



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