

Potential, constraints and  
recommendations for crops &  
orchard cultivation in arid  
mountains

---

M. Saleem Akhtar, PhD  
Professor of Soil Science  
Arid Agriculture University  
Rawalpindi  
Pakistan

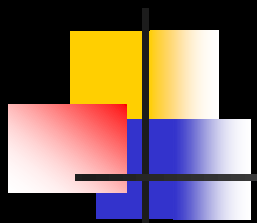


# Introduction

---

- High population growth raises food demand, and costs
- Agriculture is a critical sector to get development going
- Agricultural products stimulating entrepreneurship and investments in non-agricultural activities
- Agricultural production contribute to sustainable poverty reduction

Stabilize agriculture for stabilized societies



# Constrains for agriculture development

- Cultivable land is diminishing
- Water Resources are limited
- Natural resource base degradation at rise
- Fertilizers – P and N defficiency is wide spread
- Yield increase dependent on technological change



## Production Technology is Site Specific

---

- Delineation of pedological units provides scientific basis for transfer of crop & soil management technology
- Matching crop requirement and soil condition is key to development and transfer agro-technology
- Inventory of soils with their potential and production constraints was prepared for part of Balouchistan.



# Geological formations and sources of soil parent material

---

- Mainly limestone
- Limestone and shale
- Limestone, shale and volcanic rocks
- Shale, sandstone, and limestone
- Red clay, siltstone, and conglomerate

Landform	Parent rocks	Limestone	Representative soils	Khumak
Residuum	Limestone and shale (gray)	Siwalik sandstone	Ghazij, Kach series	
Colluvium	Conglomerate	Limestone	Mial Qaian series (Kohat)	
	Limestone	Sandstone and shale (red)	Dada series	
			Machh and Sintangi series	
			<del>Wam, sharig, Urak series</del>	
Intermountain Fans and Apron	Alluvium	Limestone	Wasti, Bela, Bibinani, and Chilton	
		Limestone and shale (red)	Maslakh, Kunar, Mula, Sangan	
		Limestone, shale, and volcanic	Injra and Toba	
		Shale, sandstone, limestone	Baghgai, Patki, and Shabaq	
Plains	Limestone with loess mixed	Limestone and shale	Malezai, Quetta, Shamoza, Sariab	
	Limestone and shale	Limestone, shale, and volcanic	Sariab, Mustung, Zard, (Quetta)	
	Limestone, shale, and volcanic	Shale, sandstone, limestone	Hathiari, Surb, Zehri and Gidder	
	Shale, sandstone, limestone	Sandstone and Shale	Khajjak, Jhatpat, Kundi, Zeran, Perar	
	Sandstone and Shale	Siwalik sandstone (Bannu)	Barshore, Pinakai, Pishin	
	Siwalik sandstone (Bannu)	Shale	Laki, Abbakhel, Minakhel, Kashu	
	Shale		Tarkhoba & Kohat in Kohat	
Basin / Playas	Limestone and shale		Azim series	
	Limestone, shale, & volcanic		Shana series	
	Shale, sandstone, & limestone		Khamat, Popalzai, Baleli, Samungli	

## River/Stream Flood Plains

### Old River Terraces

Limestone and shale

Shamozai

Limestone, shale, and volcanic

Hathiari

Shale, sandstone, limestone

Kaftari and Khambat

Wide variety rocks

Bhalwal, Tochi, Ghoriwala,  
Turola

### Subrecent Level Plain

Limestone and shale

Shamozai (subrecent)

Limestone, shale, and volcanic

Hathiari

Shale, sandstone, limestone

Kaftari and Khambat

Wide variety of rocks      Miani, Shahpur, Matli, Pacca

### Loess Plain

Original

Babak, Thall

Old re-deposited

Taleri, Hungu, Kufri, Kot

Subrecent re-deposited

Tobina, Mackeson

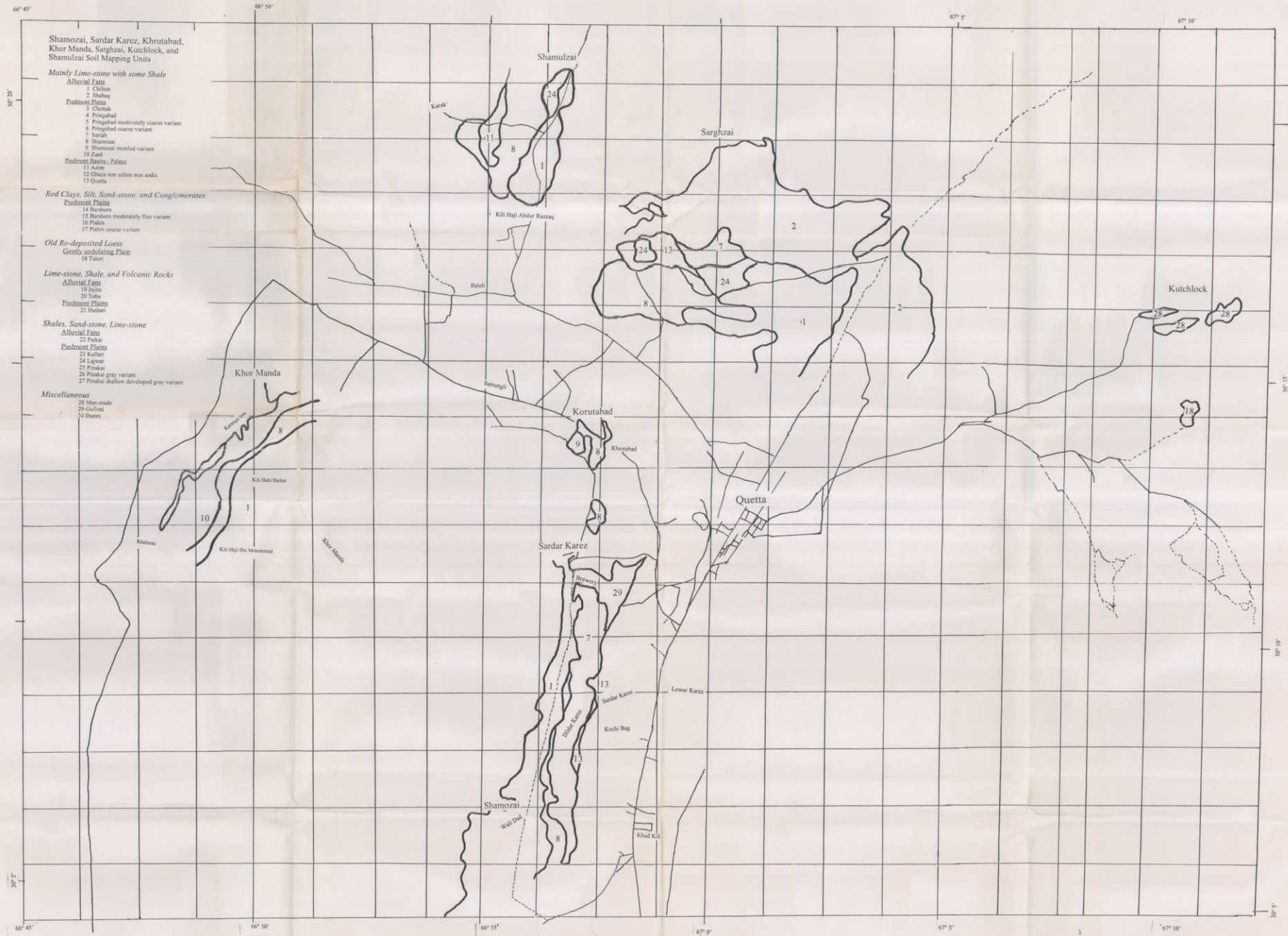


# Inventory of soil resources in Balouchistan

---

- Semi-detailed soil survey was conducted
- Soils were described in the field
- Soil sampling done each genetic horizons,
- Chemical fertility, physical characteristics, permeability test were carried out on site
- Soil salinity was also determined
- Crop suitability and Land Capability were determined





Shamozai, Sardar Karez, Khrutabad, Khor Manda, Sarghzi, Kutchlock, and Shamulzai Soil Mapping Units

Mainly Lime-stone with some Shale

- Alluvial Fans  
 1 Chibson  
 2 Shahaq  
 Piedmont Plains  
 3 Chotak  
 4 Pringabad  
 5 Pringabad moderately coarse variant  
 6 Pringabad coarse variant  
 7 Sarab  
 8 Shamozai  
 9 Shamozai mottled variant  
 10 Zard  
 Piedmont Basins / Palays  
 11 Aqim  
 12 Ghazi non saline non sodic  
 13 Quetta

Red Clays, Silt, Sand-stone, and Conglomerates

- Piedmont Plains  
 14 Barabere  
 15 Barabere moderately fine variant  
 16 Pishin  
 17 Pishin coarse variant

Old Re-deposited Loess

- Gently undulating Plain  
 18 Talari

Lime-stone, Shale, and Volcanic Rocks

- Alluvial Fans  
 19 Injira  
 20 Toha  
 Piedmont Plains  
 21 Haban

Shales, Sand-stone, Lime-stone

- Alluvial Fans  
 22 Piskai  
 Piedmont Plains  
 23 Kufan  
 24 Lajwar  
 25 Pinakai  
 26 Pinakai gray variant  
 27 Pinakai shallow developed gray variant

Miscellaneous

- 28 Man-made  
 29 Gullied  
 30 Dunes

30° 20'

30° 5'

66° 45'

66° 50'

66° 55'

67° 0'

67° 5'

67° 10'

30° 5'

30° 10'

30° 15'

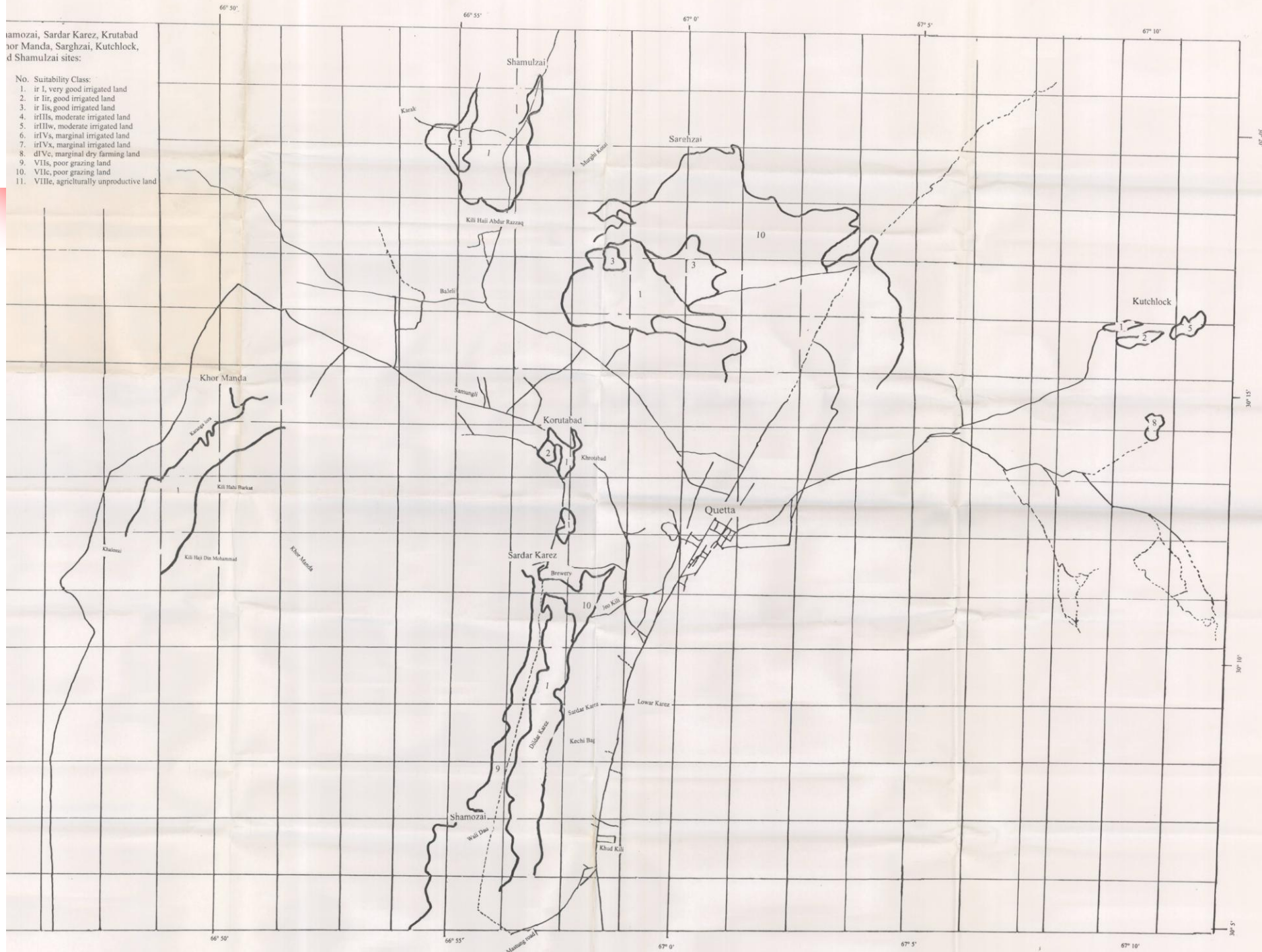
30° 20'

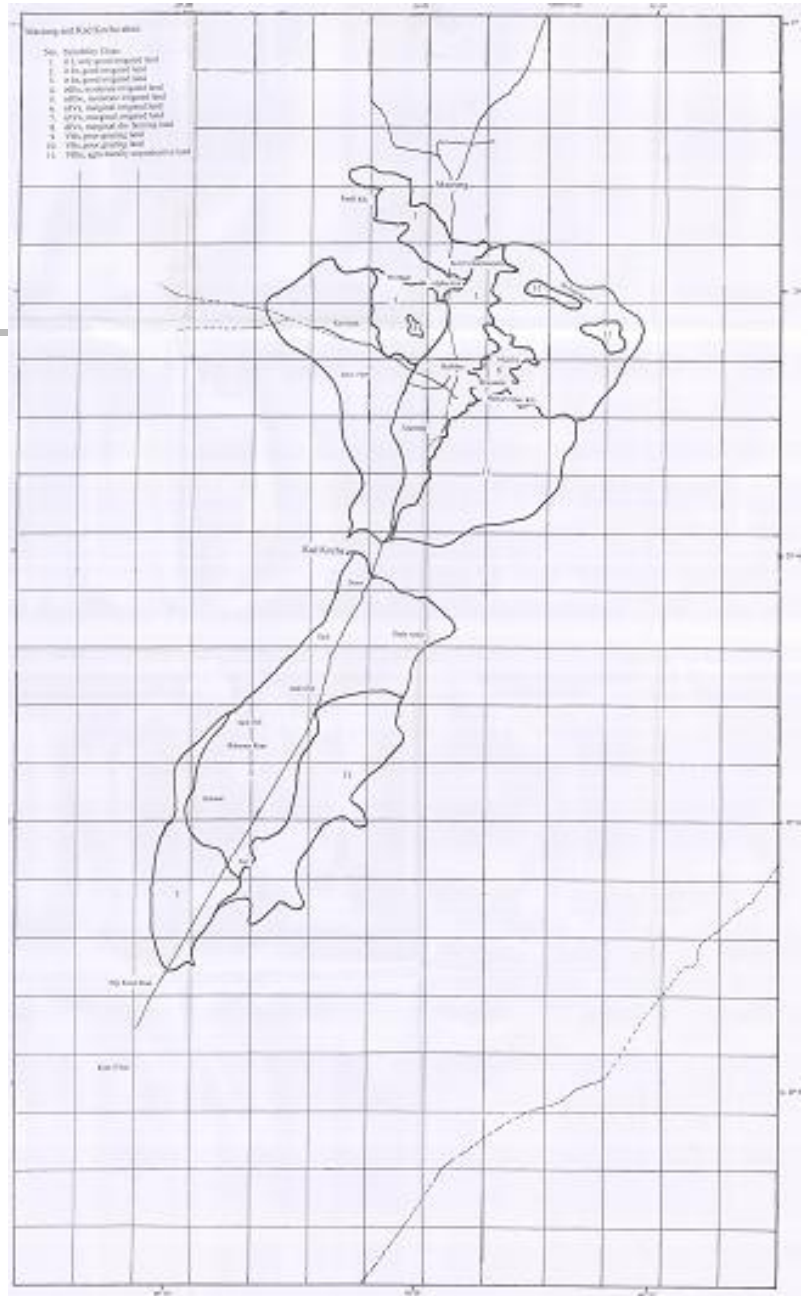
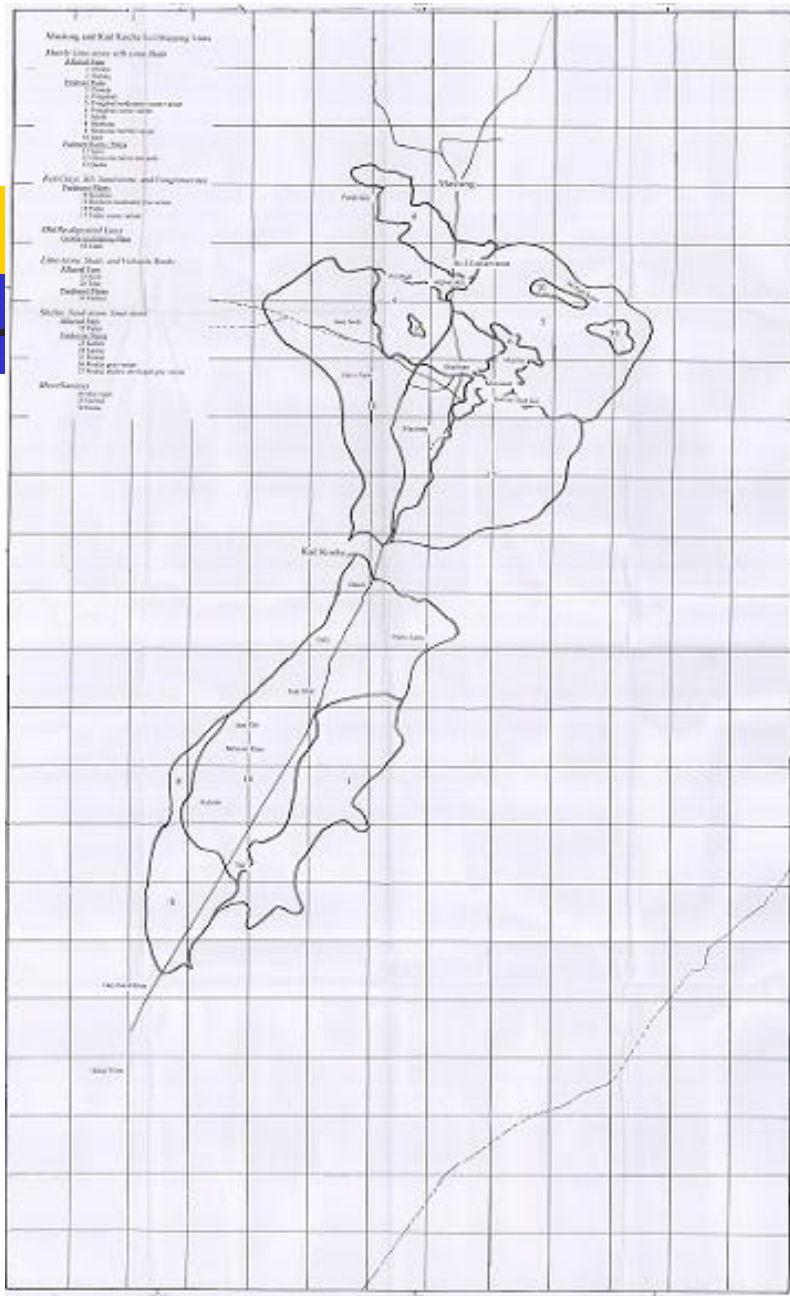
30° 25'

Shamozai, Sardar Karez, Krutabad  
Khor Manda, Sarghzai, Kutchlock,  
and Shamulzai sites:

No. Suitability Class:

1. ir I, very good irrigated land
2. ir IIr, good irrigated land
3. ir IIIs, good irrigated land
4. ir IIIls, moderate irrigated land
5. ir IIIw, moderate irrigated land
6. ir IVs, marginal irrigated land
7. ir IVw, marginal irrigated land
8. di Vc, marginal dry farming land
9. VIIs, poor grazing land
10. VIIc, poor grazing land
11. VIIIc, agriculturally unproductive land









# Summary

## Land Capability Units- constraints and extent

ir I	very good irrigated land	No constraint	14245 ha
Ir IIr	good irrigated land	local relief hindn	75
Ir IIIs	good irrigated land	Mod depth or clay	8570
Ir IIIIs	Moderate irrigated land	Mod depth or sandy	1225
Ir IIIIw	Moderate irrigated land	clayey, high water	65
irIVs	Marginal irrigated land	sandy with silt surface	2860
dIVc	Marginal dry farming land	Wind blown sand	275
VIIIs	Poor grazing land	Sandy elevated areas	40
VIIc	Poor grazing land	Gravelly loam, culit nPs	1875
VIIIe	unproductive	Serverely dissected	3505