Land use and land cover changes around Yerer mountain, Upper Awash Basin, Ethiopia

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Introduction

Ethiopian Highlands

- High human and livestock population
- Loss of vegetative cover
- Steep slope cultivation
- Flooding of bottomlands
- Loss of farmlands due to gullying
- Land degradation

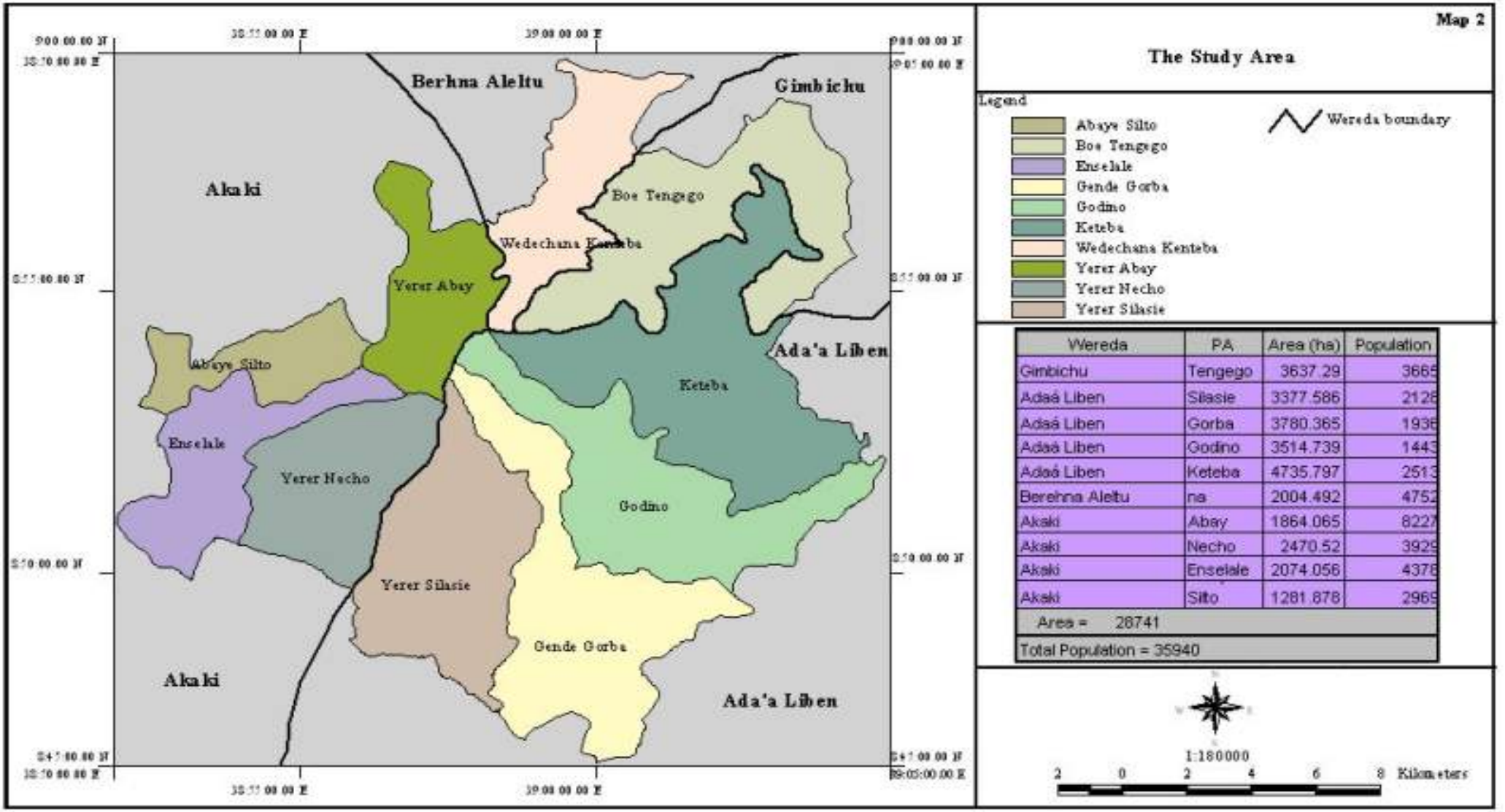
Consequences of land degradation

- Decrease in area cultivated
- Low crop yield/ha
  - *1.2 ton for cereals*
  - *0.6 tons for pulses*
  - *0.5 tons for oil crops*
- Low livestock productivity
  - *1-2 litres of milk/day*
  - *Low weight gains and*
  - *Low draught power output*

Cumulative effects:

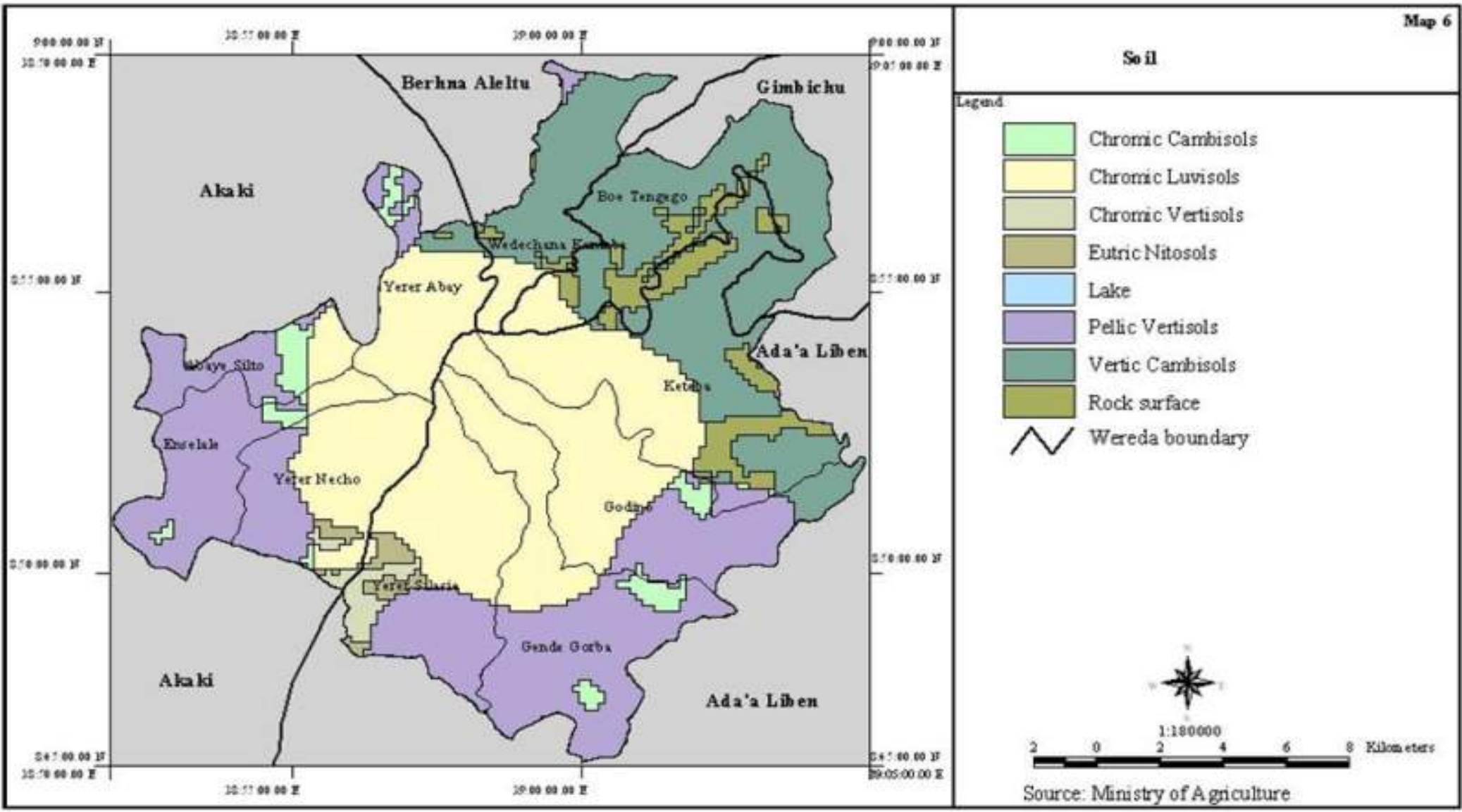
- Produce not sufficient to cover annual consumption
- Cyclic poverty and famine

The study area



Wereda	PA	Area (ha)	Population
Gimbichu	Tengego	3637.29	3665
Adaá Liben	Silasie	3377.586	2128
Adaá Liben	Gorba	3780.365	1936
Adaá Liben	Godino	3514.739	1443
Adaá Liben	Keteba	4735.797	2513
Berehna Aleltu	na	2004.492	4752
Akaki	Abay	1864.065	8227
Akaki	Necho	2470.52	3929
Akaki	Enselale	2074.056	4376
Akaki	Sito	1281.878	2969
Area = 28741			
Total Population = 35940			

The study area contd…



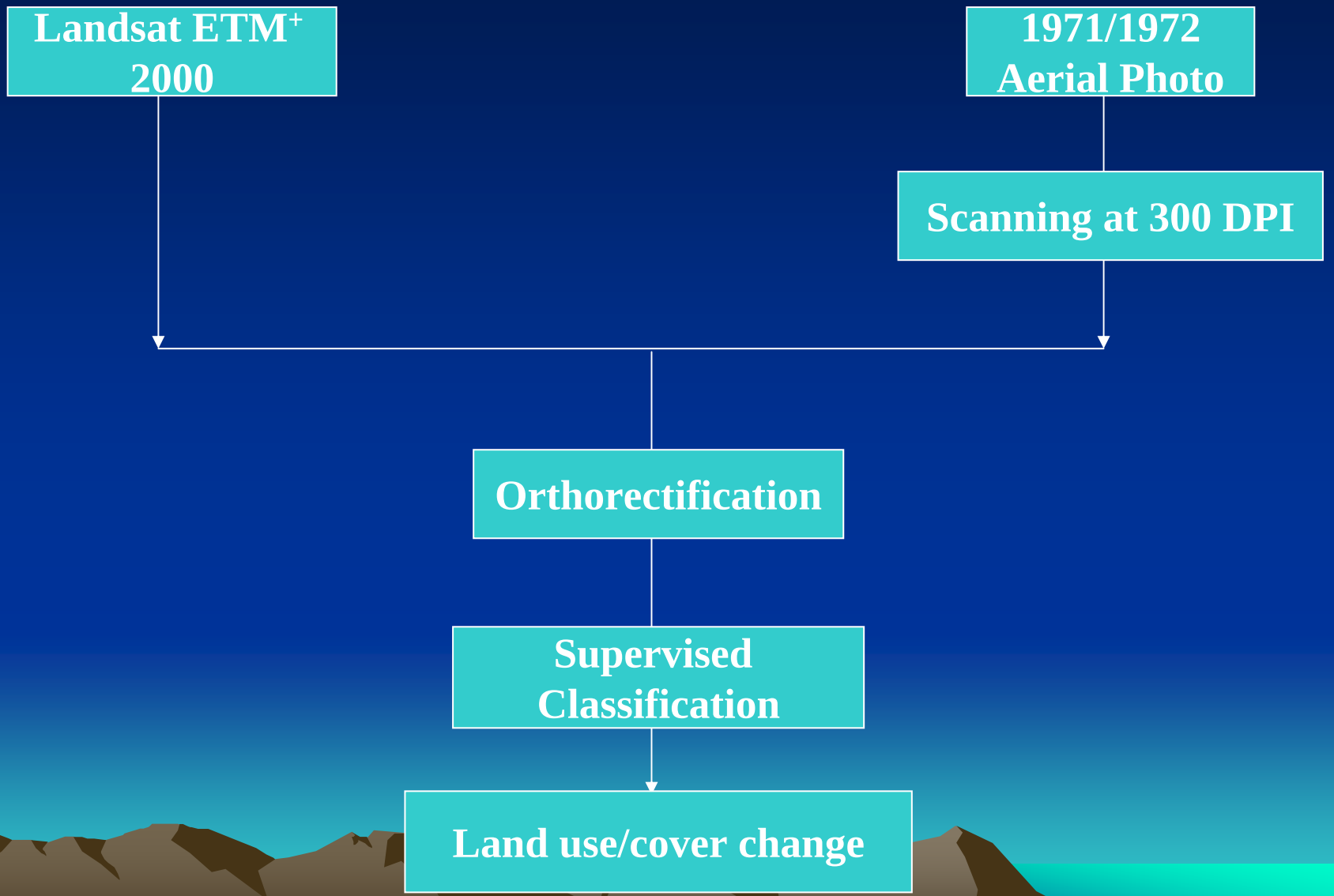
Objectives of the study

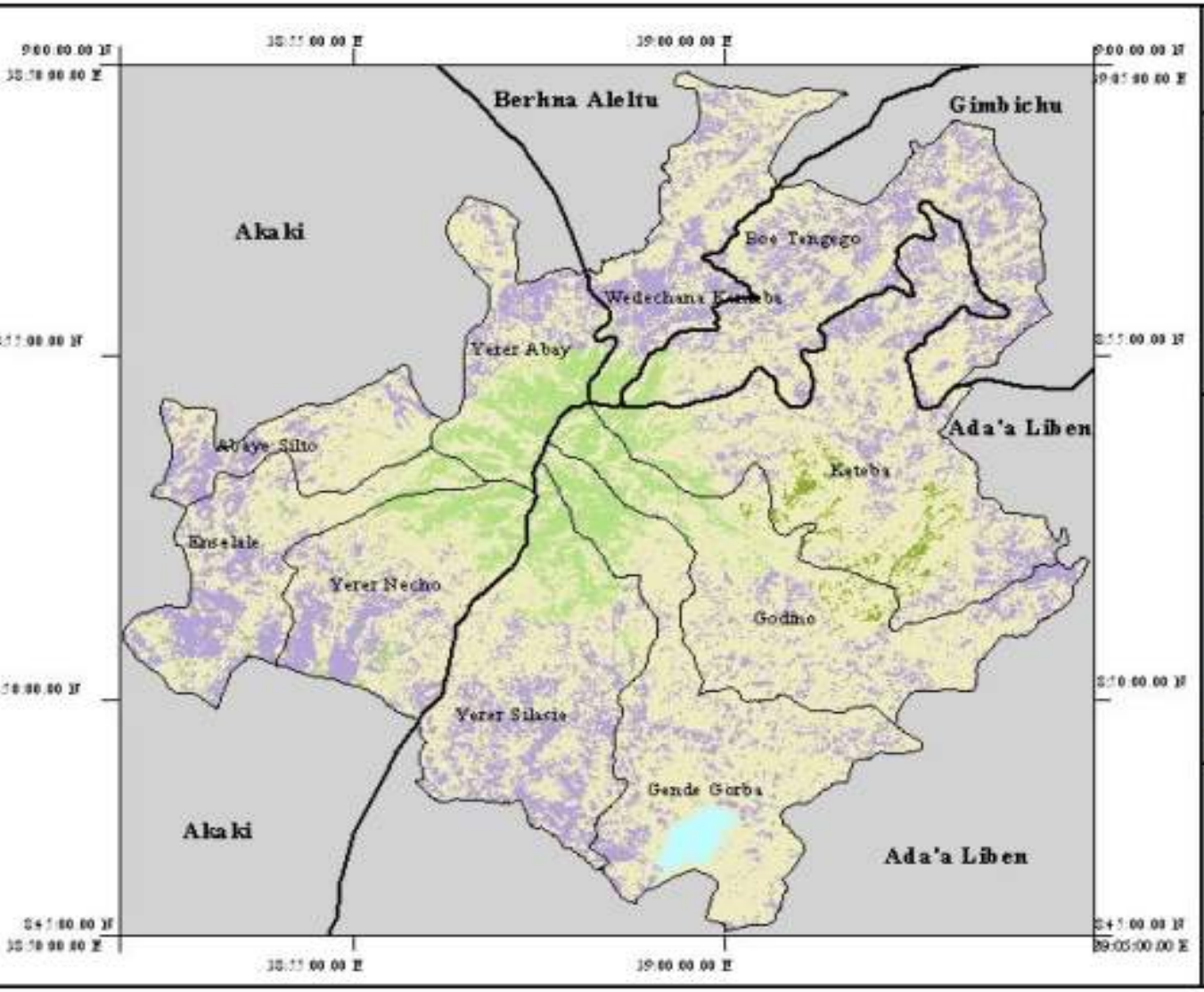
- Describe the land use land and cover changes
- Identify major causes of LULC changes
- Study the effect of land use land and cover changes
- Recommend appropriate interventions

Materials and Methods

- 1971/72 aerial photos (EMA)
- 2000 Landsat ETM+ imagery
- Wereda map with PA boundaries (CSA)
- Topographic map (EMA)
- GPS

Land Use and Land Cover





Map 3

Land Use / Land Cover: 1971/72

Legend

- Cultivated land
- Grassland
- Tree cover (Junipers and Acacia albida)
- Open Shrubland
- Water body
- Wereda boundary

Area of 1971 Land Use Land / Cover by Slope Class (ha)

	Slope class						
Land cover/use	<=2	2-8	8-16	16-30	30-50	>50	Total
Cultivation	1550	3978	1000	468	155	35	7186
Grassland	2961	7106	3650	2611	1364	1092	18784
Shrubland	3	31	60	90	49	23	256
Tree cover	32	77	104	329	654	1128	2325
Water body	180	9	1	0	0	0	190
Total	4726	11201	4815	3498	2222	2278	28741

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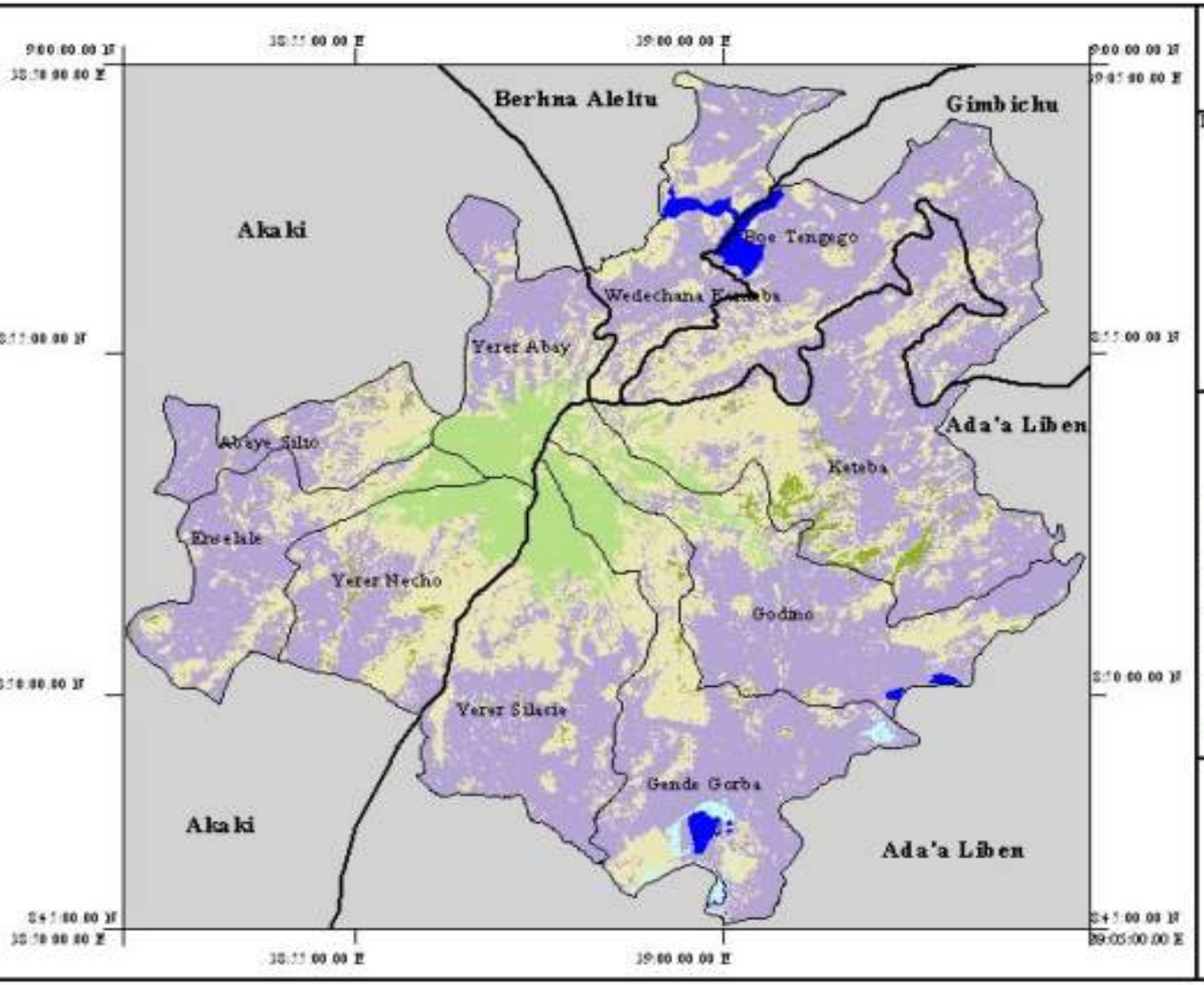
2 0 2 4 6 8 Kilometers

Source: 1971/72 Airphotos



Map 4

Land Use / Land Cover: 2000

Legend

- Cultivated land
- Grassland
- Dense Shrubland with remnant Junipers
- Open Shrubland
- Wetland
- Water body
- Wereda boundary

Area of 2000 Land Use Land / Cover by Slope Class (ha)

	Slope class						
Land cover/use	<=2	2-8	8-16	16-30	30-50	>50	Total
Cultivation	3338	8559	2718	1089	351	149	16205
Grassland	979	2431	1984	2075	1186	740	9396
Open Shrubland	40	115	61	114	93	54	478
Dense Shrubland	15	28	43	214	586	1334	2219
Wetland	82	37	4	3	5	0	132
Water body	272	31	5	3	1	0	312
Total	4726	11201	4815	3498	2222	2278	28741

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2 0 2 4 6 8 Kilometers

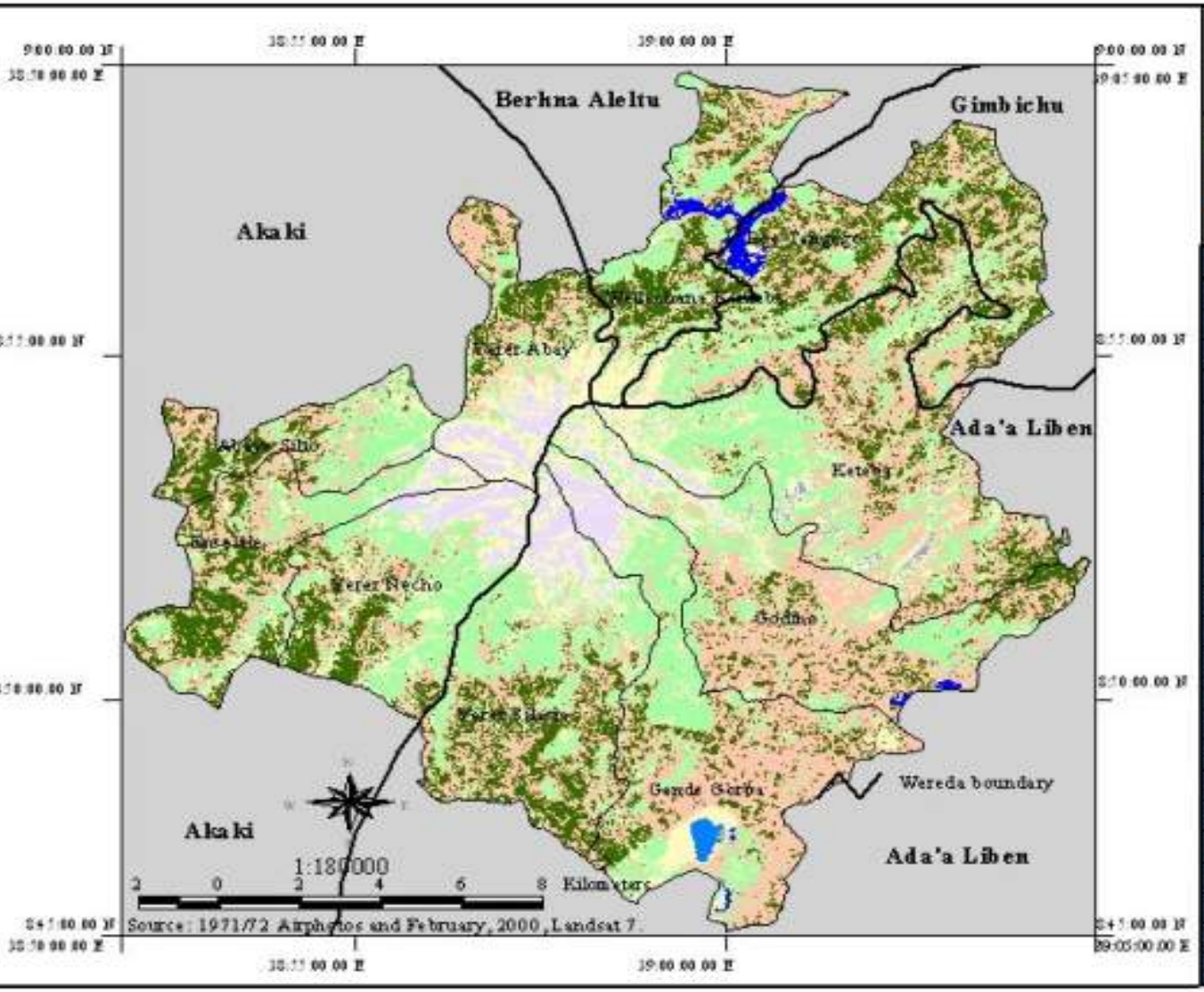
Source: Landsat 7 , February 2000.

Results

Table 1. Land cover classes their corresponding area and change (1971/72 and 2000)

Land cover types	Area in 1971/72 (ha)	(%) Of land cover (1971/72)	Area in 2000 (ha)	% Of land cover	Change between 1971/72 and 2000		
					(ha)	(%)	Average rate (ha/yr)
Cultivated land	7186	25.00	16204	56.38	+9018	125.5	+300.6
Grasslands	18784	65.35	9396	32.70	-9388	50.0	-312.9
Open shrubland	256	0.89	478	1.66	+222	86.7	+86.7
Juniperus procera Acacia albida trees[1]	2325	8.09	2219	7.71	-106	4.55	-0.2
Wetland	0	0	132	0.46	+132	-	+4.4
Water body	190	0.66	312	1.09	+122	64.2	+4.07
Total	28741	100	28741	100	-	-	-

[1] For 2000 this cover category refers to “dense shrubland with remnant Juniper trees”



Map 5

Land Use / Land Cover Change : 1971/72 - 2000

Legend

- Cultivated no change
- Grassland to Cultivated
- Water body no change
- Grassland no change
- Grassland to Water body
- Tree cover to Dense Shrubland
- Open Shrubland no change
- Other Changes

1971	2000	Area (ha)
Cultivated	Cultivated	5751
Grassland	Cultivated	10034
Open Shrubland	Cultivated	90
Tree cover	Cultivated	279
Water body	Cultivated	50
Cultivated	Grassland	1281
Grassland	Grassland	7247
Open Shrubland	Grassland	100
Tree cover	Grassland	739
Water body	Grassland	28
Cultivated	Open Shrubland	87
Grassland	Open Shrubland	316
Open Shrubland	Open Shrubland	66
Tree cover	Open Shrubland	9
Cultivated	Dense Shrubland	2
Grassland	Dense Shrubland	920
Tree cover	Dense Shrubland	1298
Cultivated	Wetland	25
Grassland	Wetland	54
Water body	Wetland	52
Cultivated	Water body	40
Grassland	Water body	212
Water body	Water body	60

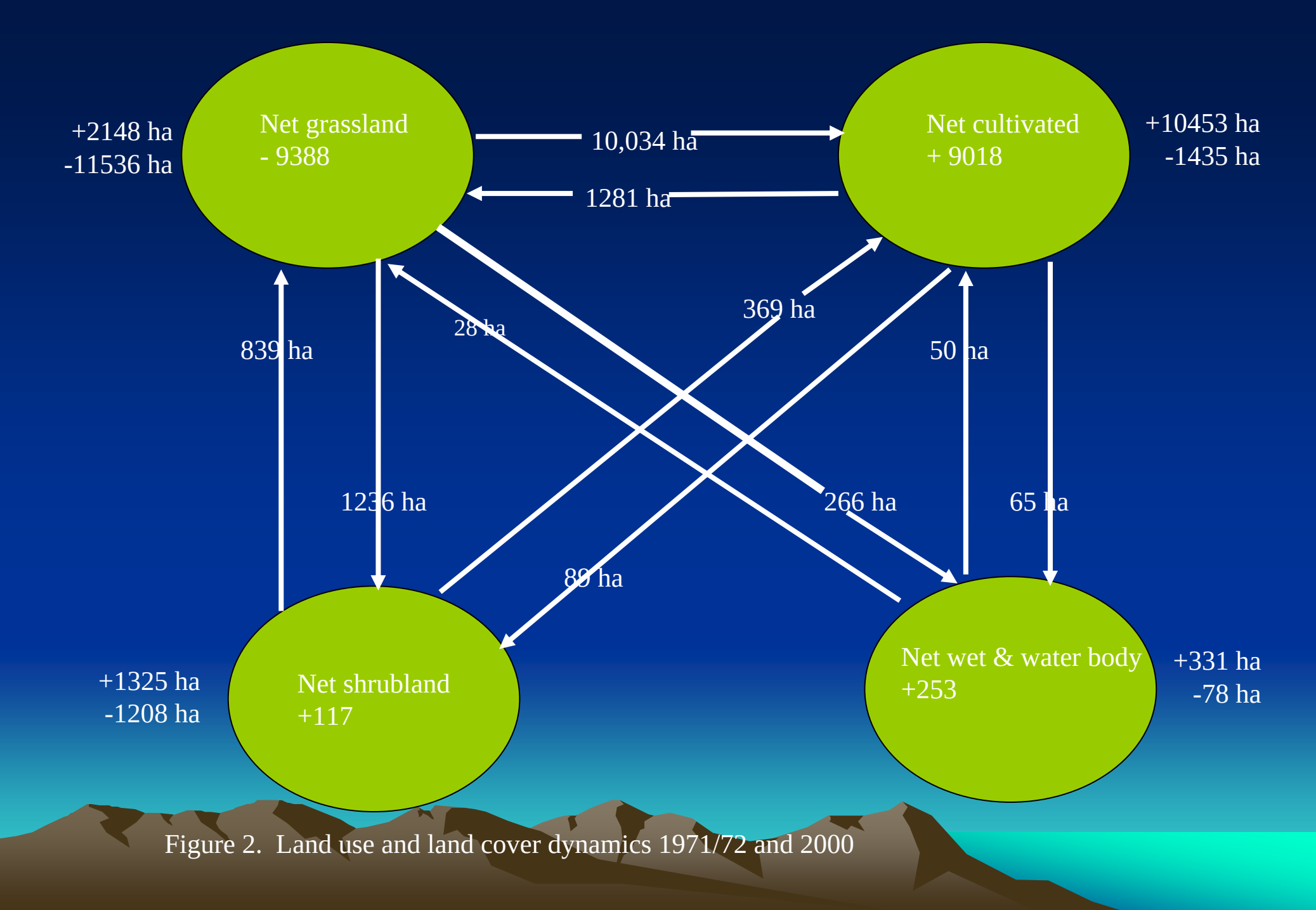


Figure 2. Land use and land cover dynamics 1971/72 and 2000

Ethiopia: Generalized highland landscape

a) Low population density/km²

b) High population density/km²

Steep slope

- Deforestation
- Overstocking food/feed shortage

Moderate slope

- Soil erosion
- Low fertility

Flat land/ plateau

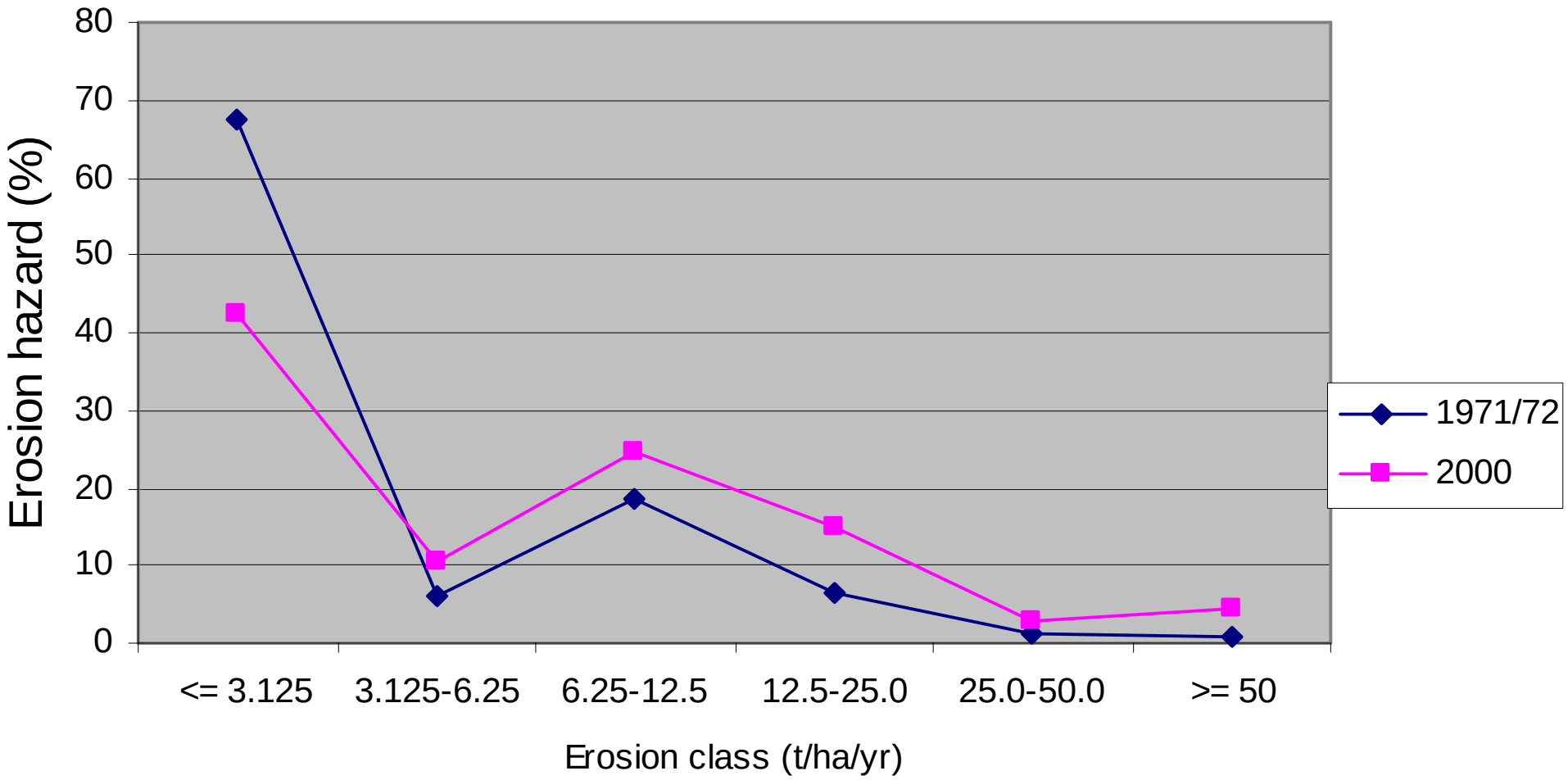
- Waterlogging

Valleys

- Expansion of crop lands
- Soil erosion
- Overstocking food/feed shortage

Courtesy: Kinde Engida

Area suffering from sheet erosion hazard (1971/72 and 2000)



Conclusion

- Cultivated land increased by 125% in three decades, mainly at the cost of grasslands
- Erosion rates were higher in 2000 than 1971/72
  - ➢ Population is one of the major driving force to these changes

Recommendations

- Giving land use rights (hilly and slope lands) the to landless – This may encourage better NRM
- Improvement of non-timber products
- Early planting for reduced erosion hazards in waterlogged areas
- Soil and water management in some areas required
- Convince communities to stop cultivating areas above 30% slope – (alternative livelihoods needed)
- Better livestock management systems (example, tethering) should be practised

- Integrated watershed management

Acknowledgements

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Thank You