National Centre of Competence in Research North-South

Pressure-State-Response in Land Resource Changes, Lake Tana Basin, Ethiopia

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Lake Tana Basin (LTB) is the uppermost part of the Blue Nile River Basin in Ethiopia. The 15,000 km² headwater is a main water source of the Blue Nile and a place of ancient agriculture and human settlement. Understanding problems related to land resource changes requires detailed examination of the factors in a pressure-state-response framework (see Birru Yitaferu 2007).

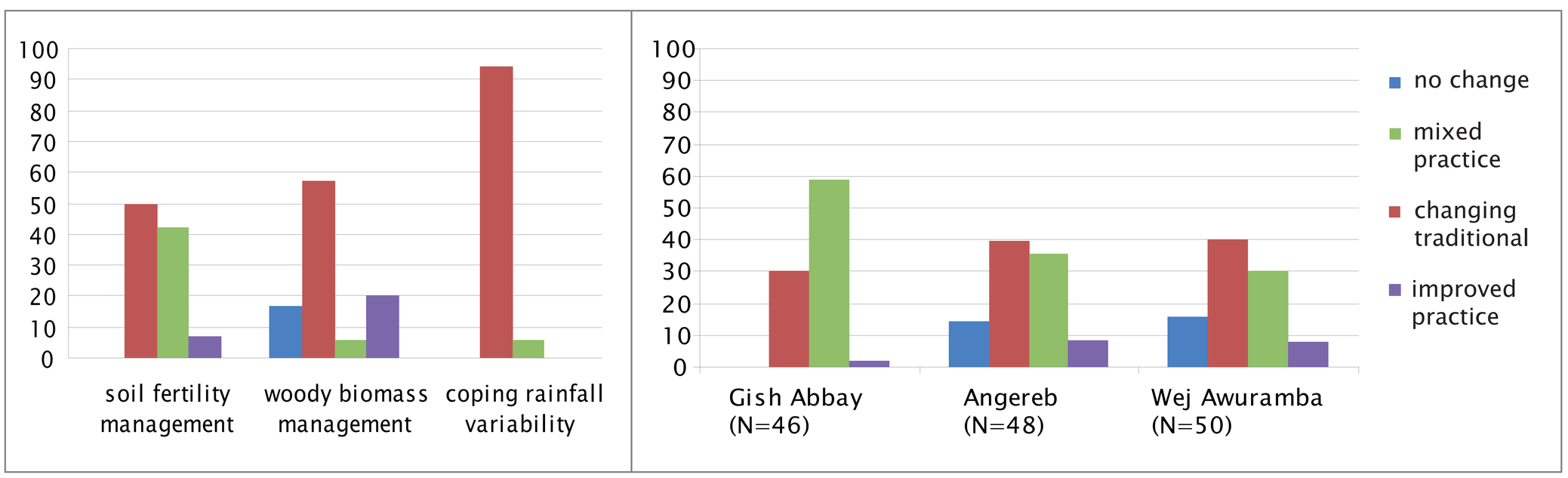
Figures 1 and 2: Mountains seen cleared of their vegetation cover and converted to crop cultivation (Angereb watershed, left), and farmers descended to riverine landscapes and lowlands where opportunities on alluvial soils and dry season irrigation are exploited (Gish Abbay, right) (Photos by Birru Yitaferu 2005)

Land degradation is serious in LTB and characterised by land use/cover change, loss of vegetation cover and biodiversity, uneven distribution of hydrological resources, and degradation of soil resources. Fragile lands such as steeply sloping mountains, wetlands and riverine systems were converted to intensive crop cultivation, particularly during the past 50 years; and runoff and soil loss in upstream areas were strongly accelerated. Pressure factors responsible for these changes were expansion of crop cultivation, loss of vegetation cover along sensitive places, and excessive removal of biomass from farmlands for non-farm uses. Overstocking of grasslands, poor management of lands such as intensive ploughing without soil conservation, and shortening fallow periods were intensified with time. These processes have shown strong association with land policies and institutional changes in the country in the 1970s and again in early 2000 in the region. Societal responses in the form of adoption of improved practices, policy and institutional adaptations, technological backups and training were also found to be inadequate compared to the deterioration of the land resources and the ever-intensifying pressure factors.

Thus, mitigation of the problems of land degradation in the LTB requires simultaneous consideration of severity of land degradation processes, intensifying pressure factors, and gaps created due to inadequate institutional and societal responses.

Variable considered	Periodical changes		
	<1970	1990	2005
Cropland expansion (%)	46	62	61
Population density (persons/km²)	60	80	200
Biomass out-flux from farms (%)	<20	50-60	>80
Livestock density TLU/km²	64	173	156
Livestock density TLU/ha grassland	2.67	9.11	12.00
Tillage frequency	2-4	3-7	3-10
Fallowing (fallow/cultivation ratio)	0.5-1.0	0.3-0.5	0.0-0.2

Table 1: Dynamics of pressure factors responsible for the land resource changes and/or land degradation in the LTB (Digital data analysis and field survey by Birru Yitaferu)



Figures 3 and 4: Societal responses to the problems of land degradation in the form of practices in soil fertility, woody biomass management and coping moisture problems (left, N=138) and of adoption of improved technologies (right, N=144), N= number of sample farmers (household survey by Birru Yitaferu)

Joint Areas of Case Studies:

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South-East Asia
South Asia
Central Asia
Central America and Caribbean
South America
Switzerland