J. Hum. Ecol., 10(5-6): 349-356 (1999)

# Influence of Settlements on Land use and Vegetation in the Rangelands of Northeastern Ethiopia: Application of Aerial Photographic Technique*

**Diress T Alemu[1], Kassim O. Farah[2] and Dickson M. Nyariki[2]**

[1]*Mekelle University College, P.O. Box 231, Mekelle, Ethiopia*
[2]*Department of Range Management, University of Nairobi, P.O. Box 29053, Nairobi, Kenya*

**KEY WORDS** Sub-Saharan Africa. Ethiopia. Pastoral Production. Settlements. Flood Recession Cultivation. Aerial Photography.

**ABSTRACT** Population pressure through settlements and encroachment of cultivation into pastoral prime grazing lands in arid and semi-arid areas of Africa have resulted in the reduction of natural vegetation cover, in turn transforming land use systems. This study was carried out to investigate changes in vegetation resources in relation to land use changes due to population pressure and the effect of time, in north-eastern Ethiopia. The methods employed involved the interpretation of aerial photographs, taken at two points in time - 1964 and 1994 - and field survey. Results revealed that significant changes have occurred in land use and vegetation types over the 30 years. Changes in land use, mainly in the form of flood recession cultivation, have apparently caused changes in vegetation structure. Based on these findings, it is recommended that research and development should strive to protect the existing grazing lands from settlements and encroaching cultivation.

## INTRODUCTION

Drylands in sub-Saharan Africa are dominated by arid to semi-arid climates characterised by low and unreliable rainfall which rarely exceeds 750mm, low soil fertility, high temperatures and elevated evapo-transpiration (Pratt and Gwynne, 1977; Le Houerou, 1980; Sandford, 1983; Coppock, 1994). These areas cover about 60 per cent of Ethiopia's land surface and are home to 12 per cent of the human population and 26 per cent of the livestock population (Coppock, 1994).

Arid and semi-arid lands (ASALs) include rangelands that support wildlife and extensive livestock operations (Pratt and Gwynne, 1977). Over the years, however, patterns of land use have significantly changed, threatening the productive capacity of vast areas in the ASALs (UN, 1977). Overgrazing on the uncultivated grazing land is also another factor influencing the degradation of land resources, especially herbaceous vegetation. Although pastoralism has evolved over a millennium and is, in many ways, a successful adaptation to the dry and ecologically fragile ecosystem, recent interventions and trends in the ASALs have worked against its continued survival. As a result, herders throughout dryland Africa have lost prime grazing lands, particularly in low-lying areas, to make room for flood recession and irrigated agriculture (Lamprey and Yussuf, 1981; Medina, 1987; Keya, 1991; Diress et al., 1998)). The causes of pressure in African drylands include population increases and the accompanying tendencies of food insecurity, ecological degradation of sensitive environments, political and economic marginalization of local populations, and extreme conditions of starvation and disaster (Hjort, 1985; Nyariki and Wiggins, 1997). Population in the study area increased several times between 1964 and 1994, mainly due to emigration for settlement.

The main production systems in the northern part of Afar Regional State are pastoral and agropastoral. In the Aba'ala *wereda* (study area), an extensive plain area is cultivated, the uncultivated area being occupied by pastoral nomads (Diress et al., 1998). Since the study area has been isolated from main stream national development for many years due to insecurity, research has neither been conducted on land use nor on vegetation resources. It is in the light of the foregoing that this study was conceived and initiated. The objective of the study was therefore to assess changes in vegetation resources in relation to land use changes, influenced by population pressure and time, with emphasis on the woody component.

*Corresponding Author:* Dr. Dickson M. Nyariki, Dept. of Range Management, University of Nairobi, PO Box 29053, Nairobi, Kenya. *Fax:* 254-2-631226
*E-mail:* Farah@net2000ke.com

## STUDY AREA

The study was carried out in Aba'ala District, in the northern part of Afar Regional State, north-eastern Ethiopia. The study area lies approximately between 13° 15' and 13° 30' N latitude and 39° 39' and 39° 55' E longitude, about 50 kilometres east of Mekelle Town. The study area consists of flat plains occasionally interrupted by few undulating hills and a series of elongated ridges, surrounded by high broken hills with very few outlets joined to other areas. The average elevation of the area is approximately 1500m above sea level. The soils are generally sandy and silty. The texture is fairly coarse, with both sands and gravel present (Hunting and MacDonald, 1976).

The study area is characterised by a semi-arid type of climate receiving bi-modal rainfall. The vegetation of the study area consists of wooded bushland, dominated by *A. etbaica* with many associated trees and shrubs (Hunting and MacDonald, 1976). A few annuals - *Aloe* and *Euphorbia* species - with few or no perennial grasses, dominate the herbaceous cover. Currently, the economy of the study area is predominantly agropastoral (Diress et al., 1998).

## METHODS

Vegetation and land use changes were assessed by use of aerial photographs (scale of 1:50,000) taken between two points in time *i.e.* 1964 and 1994. The method adopted in this study was mapping of settlements, cultivated land, vegetation cover types and other related features. All the mapped units were then subjected to aerial coverage analysis using a plani-meter to detect changes in vegetation and land use. The data obtained was analysed using simple descriptive statistics. Aerial coverage analysis has been widely used in the rangelands in the US, Australia and some parts of Africa for many years (*e.g.* Hientz et al., 1979; Owens et al., 1985; Farah, 1991; Turner et al., 1998).

Vegetation inventory and cover assessments were also made in the field by establishing a 10km transect at three different sites. The sites include (i) Abala where cultivation and grazing are practised by the settled Tigrai, (ii) Shugala where cultivation and grazing are practised by the indigenous Afar, and (iii) Murga where grazing is practised by both the Tigrai and Afar. Six sampling points were marked out along each transect at regular intervals of 2km. Four plots of 10m by 10m were established at each sampling point. The number of individuals of each species and two perpendicular crown diameters for each woody species were recorded in the period from January to June 1997. The records were then used to calculate vegetation attributes: density, frequency, cover and diversity. The Importance Value Index (IVI), which is the sum of the relative density, relative frequency and relative cover values, was used to select the most abundant species (IVI>10%). (Note that IVI ranges from 0 to 300% (Mueller-Dombois and Ellenberg, 1974).) The Completely Randomised Design (Steel and Torrie, 1980; Microsoft Excel, 1992) was used to compare changes of each selected species within each site. Descriptive statistics, were also used to analyse woody vegetation data.

## RESULTS AND DISCUSSION

### Aerial Photo Analysis of Change in Vegetation and Land Use

Results from the interpretation of aerial photographs showed cultivated fields, settlements, physiognomic vegetation types, and related prominent features (flooded plains, hills/ridges, roads, rivers, valleys, gullies, exposed rocks and sand deposits). Emphasis was placed on the major mapping units in terms of cover *i.e.* settlement, cultivation and total vegetation mapping units. The major mapping units for each year and observed changes are summarised in table 1.

As shown in table 1 and figure 1, significant changes occurred in land use between 1964 and 1994 in the study area. Cultivated land, settlements, and bare ground (gullies, sand deposits and exposed rocks) increased from 0.27% (97.5ha) to 7.34% (2,605ha), 0.01% (5ha) to 0.51% (180ha), and 7.78% (2,790ha) to 9.98% (3,540ha), respectively. Vegetation cover, however, decreased from 87.88 to 75.52%.

Areas covered by settlements increased markedly between 1964 and 1994 in the flood plains as a result of a high influx of people from

**Table 1: Vegetation and land use cover types in 1964 and 1994, and per cent change**

| *Mapping units* | *Area covered (ha)* | | *Per cent change* |
|---|---|---|---|
| | *1964* | *1994* | |
| Cultivated land | 97.5 | 2605.0 | 2572 |
| Settlement | 5.0 | 180.0 | 3500 |
| *Vegetation units (D1-D11):* | 31252.5 | 26787.5 | -14 |
| Grasslands (D1) | 25.0 | 87.5 | 250 |
| Bushed grasslands (D2) | 4970.0 | 2097.5 | -58 |
| Shrub grasslands (D3) | 55.0 | 200.0 | 264 |
| Bushlands (D4) | 3300.0 | 4862.5 | 44 |
| Dense bushlands (D5) | 1392.5 | 940.0 | -32 |
| Bushland thickets (D6) | 1350.0 | 1262.5 | -6 |
| Wooded grasslands (D7) | 897.5 | 290.0 | -68 |
| Wooded-bushed grasslands (D8) | 7950.0 | 6960.0 | -12 |
| Wooded bushlands (D9) | 8505.0 | 9495.0 | 12 |
| Wooded dense bushlands (D10) | 1392.5 | 592.5 | -57 |
| Woodlands (D11) | 1345.0 | 0.0 | -100 |
| Rivers, gullies, sand deposits and bare ground | 4206.5 | 5900.0 | 40 |
| Total | 35561.5 | 35472.5 | -89 |

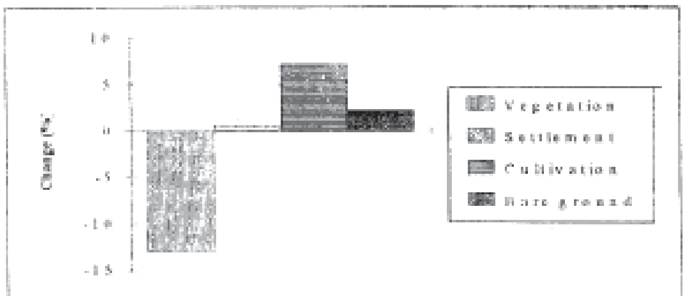


**Fig. 1. Per cent land use and vegetation cover changes from total area between 1964-1994**

Tigrai into the study area. Cultivated land accounted for 44.42% of the 5,865ha of the flood plains in 1994 while only 1.66% was covered by cultivated fields in 1964. This shows that, in terms of extent, cultivation was most conspicuous in the flood plains. The results indicate that the area has experienced a progressive expansion of flood recession agriculture to the limited area possible for cultivation as a result of continued settlements over the last three decades. In fact, it has been reported that many herders in some parts of sub-Saharan Africa have lost their prime grazing lands, particularly in low-lying areas, to make room for flood recession and irrigated agriculture (Keya, 1991; Hadley, 1993; Bourn and Wint, 1994; Ali, 1995). The study area is a case in point where dry season grazing land in the flood plains has been cleared for cultivation.

The decrease in natural vegetation cover has been mainly due to the steady clearance of natural vegetation especially woodlands, wooded grasslands, wooded-bushed grasslands and bushed grasslands in the flood plains to make room for cultivation and settlement. In addition, overgrazing and erosion have resulted in the conversion of wooded-bushed grasslands and bushed grasslands into wooded bushlands and exposed surface, particularly in the hills and ridges. Elsewhere, an increase in woody vegetation cover has been commonly reported as a response to heavy grazing (Pratt and Gwynne, 1977; Le Houerou, 1980; Walker et al., 1981; Walker and Noy-Meir, 1982; Warren and Hutchinson, 1984; Skarpe, 1991; Coppock, 1994). It can be deduced from the results of this study that the whole area must, in the past, have been either subjected to heavy use or undergone major climatic changes. It is difficult, however, to assert at present that climatic change has contributed to the observed vegetation trend due to lack of long-term climatic and vegetation data. Results from aerial photograph interpretation, nevertheless, provided adequate information on patterns of land use, vegetation change, range condition and an overall view of the area. This is supported by Hientz et al. (1979), Owens et al. (1985), and Turner et al. (1998), who reported that in the semi-arid rangelands where sampling requires a substantial amount of resources aerial photographs of the same area at different times provide valuable information.

### Vegetation Inventory

The study area was composed of mixed woody species dominated by *Acacia, Grewia* and allied genera. A total of 43 woody species were identified (see Appendix), of which 11 species shared dominance in the three study sites. Six of the 11 common species (*Acacia etbaica, A.mellifera, A.nubica, A.tortilis, Grewia erythrea and Salvadora persica)* had mean IVI > 10% in all the sites (Fig. 2). *A.etbaica* was found to be the dominant species with the mean IVI of 105.48%, 91.46%, and 123.89% for Abala (site I), Shugala (site II) and Murga (site III) respectively. Mueller-Dombois and Ellenberg (1974) reported that the species with the highest IVI are referred to as dominants. The species of other plant forms encountered during the study period were also identified and recorded. Note that one should expect additional species to be listed if the inventory were done over a longer period of time and in different seasons.

### Composition, Cover and Density

There were no significant differences ($P>0.05$) in woody species composition, cover and density from site to site. This could be attributed to the fact that one or all land use practices had similar effects on vegetation composition, cover and density on a wider area. However, species composition, cover and density showed significant differences ($P<0.05$) among distances for each species within each site (see Table 2 and Figures 3a, 3b and 3c).

In general, the study area had moderate vegetation cover in terms of trees and shrubs in the hills and ridges. Herbaceous cover was, however, very poor with few perennial grasses. Bare ground was common in most sites and the understorey vegetation was composed of Aloe and Euphorbia species. Therefore, grazing was very poor during

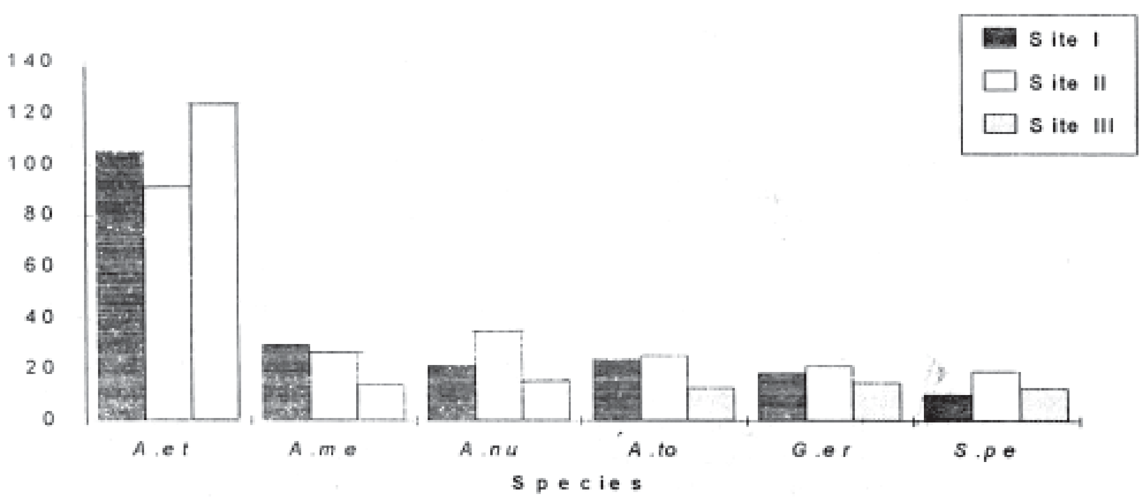


**Fig. 2: Mean importance value index (IVI) of six selected woody species for three study sites – Abala (site I), Shugala (site II) and Murga (site III)[1]**

1 A.e = *Acacia etbaica*; A.m = *A.mellifera*; A.n= *A.nubica*; A.t = *A.tortilis*; G.e = *Grewia erythrea*; and S.p = *Salvadora persica*

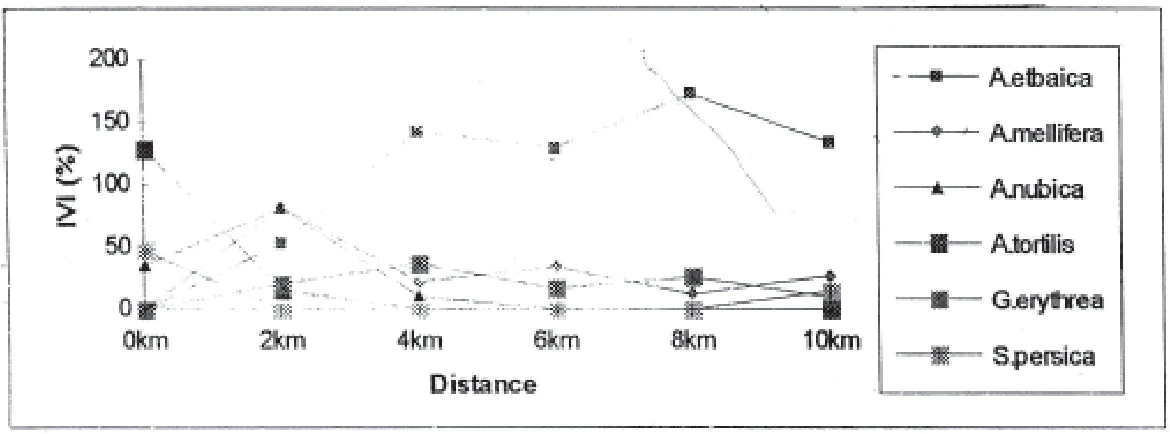


**Fig. 3a. Importance Value Index (IVI) of 6 selected woody species along a 10km distance in site I**

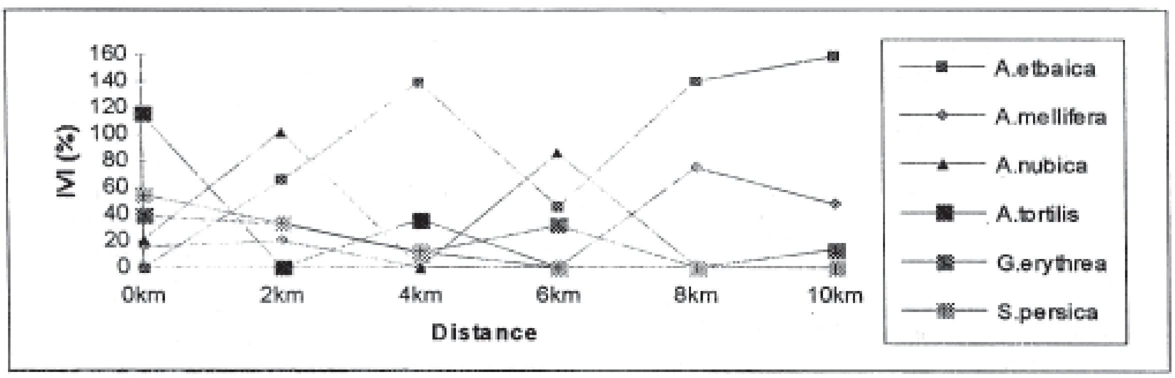


**Fig. 3b. IVI of six selected woody species along a 10km distance in site II**

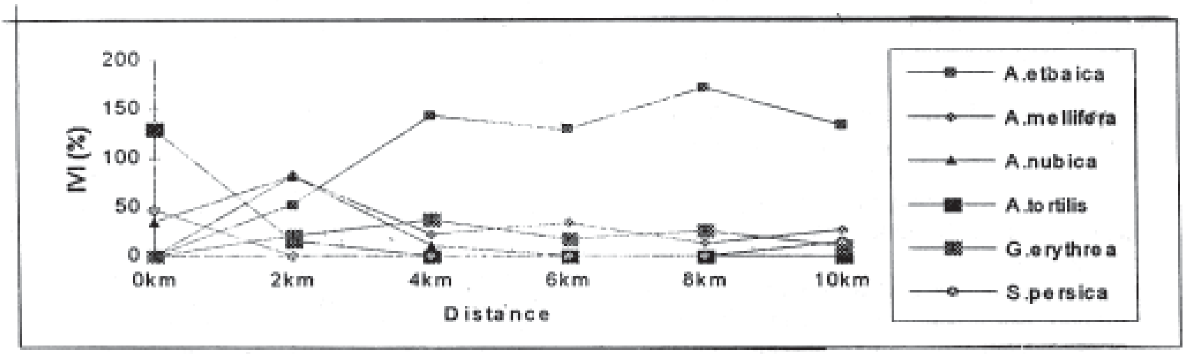


**Fig. 3c. IVI of six selected woody species along a 10km distance in site III**

**Table 2: Species composition (%), crown cover (%) and density (N/ha) for six selected trees and shrubs in three study sites (mean values)[1]**

| *Site* | *Vegetation Attribute* | *Species* | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | *A.et.* | *A.me.* | *A.nu.* | *A.to.* | *G.er.* | *S.pe.* | *SE* |
| Abala | Composition | 22.9$^{a}$ | 18.1$^{ab}$ | 7.2$^{b}$ | 6.6$^{b}$ | 7.8$^{b}$ | 1.8$^{b}$ | ±3.3 |
| | Cover | 51.2$^{a}$ | 3.3$^{b}$ | 3.1$^{b}$ | 10.6$^{b}$ | 0.2$^{b}$ | 4.5$^{b}$ | ±7.9 |
| | Density | 158.0$^{a}$ | 125.0$^{ab}$ | 50.0$^{ab}$ | 46.0$^{ab}$ | 54.0$^{ab}$ | 13.0$^{b}$ | ±22.6 |
| Shugala | Composition | 28.2$^{a}$ | 11.1$^{b}$ | 10.3$^{b}$ | 6.8$^{b}$ | 10.3$^{b}$ | 3.4$^{b}$ | ±3.5 |
| | Cover | 32.7$^{a}$ | 3.8$^{b}$ | 11.4$^{b}$ | 10.8$^{b}$ | 0.2$^{b}$ | 5.8$^{b}$ | ±4.7 |
| | Density | 138.0$^{a}$ | 54.0$^{b}$ | 50.0$^{b}$ | 33.0$^{b}$ | 50.0$^{b}$ | 17.0$^{b}$ | ±17.1 |
| Murga | Composition | 33.1$^{a}$ | 7.2$^{b}$ | 5.8$^{b}$ | 1.4$^{b}$ | 9.4$^{b}$ | 2.2$^{b}$ | ±4.8 |
| | Cover | 47.8$^{a}$ | 3.3$^{b}$ | 1.5$^{b}$ | 8.0$^{b}$ | 0.1$^{b}$ | 5.0$^{b}$ | ±7.4 |
| | Density | 192.0$^{a}$ | 42.0$^{b}$ | 33.0$^{b}$ | 8.0$^{b}$ | 54.0$^{b}$ | 13.0$^{b}$ | ±27.9 |
| SE | Composition | ±2.9 | ±3.2 | ±1.3 | ±1.8 | ±0.70 | ±0.4 | |
| | Cover | ±5.7 | ±0.2 | ±3.1 | ±0.9 | ±0.03 | ±0.4 | |
| | Density | ±15.8 | ±25.9 | ±5.6 | ±11.0 | ±1.40 | ±1.4 | |

1 In a row or column, numbers followed by a common superscript letter(s) for the respective vegetation attributes are not significantly different ($P>0.05$). SE = Standard Error of Mean

the study period and animals, including cattle, seemed to be adapted to browsing. This is a common phenomenon in most rangelands in East Africa (Pratt and Gwynne, 1977).

## CONCLUSIONS

This study utilised a combination of findings from the interpretation of aerial photographs taken at two points in time *i.e.* 1964 and 1994 and a field survey. The results show that the study area has faced land use changes over a period of 30 years. A large portion of the plain areas has been severely degraded in vegetation resources as a result of in-migration of people and the consequent clearance of vegetation for cultivation and overgrazing to maintain food security. This has, however, failed to take into consideration the vulnerability of the ecosystem. Soil erosion has been made worse due to vegetation removal. In sum, declining vegetation cover, formation of big gullies, abandonment of cropping fields, declining water availability and reduction of wildlife numbers and species diversity are the outcomes of recent settlements, expanding cultivation and recurrent drought in the area.

Pastoralists in north-eastern Ethiopia currently favour flood recession cultivation for their livelihood. But it is doubtful whether the flood plain can sustain continuous cropping. Land use changes such as more flood recession and irrigated agriculture will continue to occur and will influence change in the range resource most likely adversely, unless steps are taken to reverse the trend. The long term survival of pastoral production will be questionable, therefore, considering the increasing human population, which would seek ways to increase food production to meet increased demand either through flood or irrigation agriculture. Since a very small area of the plain can support flood recession or irrigated agriculture, increased demand for land for cultivation cannot be fulfilled unless conservation is undertaken on the eroded and abandoned sites. Soil and water conservation measures are, therefore, needed in both grazing and cropping lands. In addition to this, grazing reserve areas should be established to alleviate shortage of dry season grazing. Further, research should focus on the determination of woody and herbaceous biomass and selective clearing of unwanted species so as to increase herbaceous cover for livestock feed.

## REFERENCES


Ali, S.: *Pastoral Systems of Ethiopia and Sustainable Development: The Case of Afar in the Awash Valley of Ethiopia*. Paper presented at PINEP Regional Workshop, Jan.16-19, 1995, Kenya (1995).

Brown, D. and Wint, W.: *Livestock, Land Use and Agricultural Intensification in Sub-Saharan Africa*. Pastoral Development Network Paper 37a, ODI, London (1994).

Coppock, D.L.: *The Borana Plateau of Southern Ethiopia: Synthesis of Pastoral Research, Development and Change, 1980-91*. ILCA (International Livestock Centre for Africa), Addis Ababa, Ethiopia (1994).

Diress, T.A., Farah, K.O. and Mbuvi, D.M.: *Impact of Land use Practices on Woody Vegetation Resources in the*

*Semi-arid Area of Aba 'ala District, North Afar, Ethiopia*. The African Pastoral Forum Working Paper Series No. 16, Department of Range Management, University of Nairobi, Kenya (1998).

Farah, K.O.: Natural vegetation. In: *Environmental Change and Dryland Management in Machakos District, Kenya 1930-1990*. ODI Working Paper No. 53. ODI, London (1991).

G/Mariam, A.: Livestock and economic differentiation in north-eastern Ethiopia: The Afar case. *Nomadic Peoples,* **29**: 10-20, Uppsala, Sweden (1991).

Hadley, M.: *Grasslands for Sustainable Ecosystems* (pp. 21-28). In: Proceedings of the XVII International Congress, Australia (1993).

Heintz, T.W., Lwis, J. K. and Waller, S.S.: Low level aerial photography as a management and research tool for range inventory. *J. Range Manage.*, **32**: 247-249 (1979).

Helland, J.: *An Analysis of Afar Pastoralism in the North-eastern Rangelands of Ethiopia*. ILCA, Addis Ababa, Ethiopia (1980).

Hjort, A.: Interdisciplinary views on land management, an introduction (pp. 9-15). In: A. Hjort (Ed.), *Land Management and Survival*. Nordiska afriainstitutes, Sweden (1985).

Hunting Technical Services and Sir. M. MacDonald and Partners: Tigrai rural development study, Phase II main report. London (1976).

ILCA: *New ways for Old Worlds: Development and Research, New Approach to the Ethiopian Rangelands Development Project*. ILCA, Addis Ababa, Ethiopia (1981).

Keya, G.A.: Alternative policies and models for arid and semi-arid lands in Kenya (pp.73-89). In: *Proceedings of a Seminar on Development Intervention in African Drylands: When the grass is gone*, No.25. Scandinavian Institute of African Studies, Sweden (1991).

Lamprey, H.F. and Yussuf, H.: Pastoralism and desert encroachment in northern Kenya. *AMBIO: A Journal of the Human Environment,* **10**: 131-134 (1981).

Le Houerou, H.N.: *The Role of Browse in the Management of Natural Grazing Lands*. International Symposium on Browse in Africa, Addis Ababa 08-12 April 1980. ILCA, Addis Ababa, Ethiopia (1980).

Medina, E.: Requirements, conservation and cycles of nutrients in the herbaceous layer (pp 39-66). In: B.H. Walker (Ed.), *Determinants of Tropical Savannas*. IUBS, Miami (1987).

Microsoft Excel Analysis Tool Park: *Users Guide 2, Worksheet Analysis*. Grey Matter International., Cambridge, MA, p. 2-55 (1992).

Mueller-Dombois, D. and Ellenberg, H.: *Aims and Methods of Vegetation Ecology*. John Wiley and Sons, New York (1974).

Nyariki, D. M. and Wiggins, S.: Household food insecurity in sub-Saharan Africa: Lessons from Kenya. *British Food Journal,* **99**: 249-262 (1997).

Owens, M.K., Gardiner, H.G. and Norton, B.E.: A photographic technique of repeated mapping of rangeland plant populations in permanent plots. *J. Range Manage.*, **38**: 231-232 (1985).

Pratt, D. J. and Gwynne, M. D.: *Rangeland Management and Ecology in East Africa*. Hodder and stoughton, London, UK (1977).

Sandford, S.: *Management of Pastoral Development in Third World*. John Wiley and Sons, London (1983).

Skarpe, C.: Spatial patterns and dynamics of woody vegetation in an arid savanna. *Journal of Vegetation Science,* **2**: 565-572 (1991).

Steel, R.G.D. and Torrie, J.H.: *Principles and Procedures of Statistics: A Biometrical Approach*, Second Edn. McGraw-Hill, New York (1980).

Turner, R.M, Ochung, H.A. and Turner, J.B.: *Kenya's Changing Landscape*. The University of Arizona Press,Tuscon, U.S.A. (1998).

United Nations: *Desertification: Its Causes and Consequences*. Pergamon press, Oxford (1977).

Walker, B.H., Ludwig, D., Holling, C.S. and Peterman, R.M.: Stability of semi-arid savanna grazing systems. *J. Ecology,* **69**: 473-498 (1981).

Walker, B.H. and Noy-Meir, I.: Aspects of the stability and resilience of savanna ecosystem (pp. 556-590). In: B.J. Huntley and B.H. Walker (Eds.), *Ecology of Tropical Savannas*. Spring Vertag, Berlin (1982).

Warren, P.L. and Hutchinson, C.F.: Indicators of rangeland change and their potential for remote sensing. *Journal of Arid Environment,* **7**: 107-126 (1984).

**Appendix: List of indigenous plant species recorded during the study period in Abala**

| *Botanical Name* | *Local name* | | *Family* | *Life form* |
|---|---|---|---|---|
| | *Afarigna* | *Tigrigna* | | |
| *Acacia etbaica* | Sekakto | Seraw | Leguminosae | Tree (T) |
| *A. mellifera* | Merkito | Teklbe | Leguminosae | T |
| *A. nilotica* | Gessalto | Kassal | Leguminosae | T |
| *A. nubica* | Germoita | Adjo | Leguminosae | Shrub (S) |
| *A. senegal* | Tekeble | Teklbe | Leguminosae | . T |
| *A. tortilis* | Aepto | Gumero | Leguminosae | T |
| *Balanites aegyptiaca* | Oodaito | Bedano | Balanitaceae | T |
| *B. rotundifolia* | Alaito | Bedano | Balanitaceae | T |
| *Boscia coriaceae* | Denenoita | | Capparidaceae | S |
| *Cadaba rotundifoilia* | Alengalita | | Leguminosae | S |
| *Cadia purpurea* | Silien | Silien | Leguminosae | S |
| *Calotropis procera* | Gelato | | Asclepiadaceae | S |
| *Capparis tomentosa* | Andalto | Andel | Capparidaceae | S |
| *Combretum molle* | Dokhoita | Sesem | Combretaceae | T |
| *Commiphora spp.* | Adohadi | Anqa | Boragnaceae | S |
| *Commiphora Spp.* | Kurbita | Anqa | Boragnaceae | S |
| *Commiphora spp.* | Terarita | Anqa | Boragnaceae | T |
| *Cordia gharaf* | Maderto | Madera | Boragnaceae | T |
| *C. ovalis* | Leimaderto | Madera | Boragnaceae | S |
| *Delonix elata* | Amaito | | Caesalpinioideae | T |
| *Dobera glabra* | Gersaito | Gersa | Salvadoraceae | T |
| *Dodonea angustifolia* | Sasat | Tahses | Sapindaceae | S |
| *Ficus cycomorus* | Sublaito | Shagla | Moraceae | T |
| *Grewia bicolor* | Dewaito | | Tiliaceae | S |
| *G. erythrea* | Hidaito | Artatmoi | Tiliaceae | S |
| *G. ferruginea* | Ditita | Dintu | Tiliaceae | S |
| *G. tenax* | Hidaito | Artatimoi | Tiliaceae | S |
| *G. villosa* | Hivellita | Hibele | Tiliaceae | S |
| *Indigofera articulata* | Galela | | Leguminosae | S |
| *Lycium shawii* | Hidalisaito | Berale | Solanaceae | S |
| *Maerua angolensis* | Hidaltifera | | Capparidaceae | S |
| *Nicotiana glauca* | Adihara | Cherged | Solanaceae | S |
| *Rhus natalensis* | Atemeta | Ateme | Anacardiaceae | S |
| *Salvadora persica* | Adaito | Adaimamo | Salvadoraceae | S |
| *Solanum incanum* | Kosina | Ingule | Solanaceae | S |
| *Zizyphus spina-christi* | Kusraito | Kunshira | Rhamnaceae | T |
| * *Yucca* | Aseraito | | Agavaceae | T |
| * | Sinklilsie | Tetemagajen | | T |
| * | hurufili | Tetemenshu | | S |
| * | Numhila | | | S |
| * | Hayokaito | | | Climber (C) |
| * | Katoita | | | T |
| * | Yeluito | Yalo | | T |
| *Aerva javanica* | Oilaito | | Amaranthaceae | Forb (F) |
| *Abutilon anglosomaleae* | Hambokto | | Malvaceae | F |
| *Aloe spp.* | lure | | Liliaceae | F |
| *Euphorbia spp.* | Tarto | | Euphorbiaceae | F |
| *Cynodon spp.* | | | Giraminea | Grass (G) |
| *Cenhrus spp.* | | | Giraminea | G |

* Species not identified by their botanical names