



Research Article

Key livelihood tree species in Omo Biosphere Reserve: a preliminary documentation towards the investigation of land use change impact on key livelihood tree populations

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ABSTRACT

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The study documented and prioritized key livelihood tree species in Omo Biosphere Reserve, Nigeria as a preliminary step towards the evaluation of land use change impact on key livelihood tree populations. Data were collected using structured questionnaire administered to two hundred randomly selected adults resident in the reserve. A total of thirty-eight key livelihood tree species were documented and prioritized. The highly ranked among the species include *Khaya ivorensis* (1st), *Nauclea diderrichii* (2nd), *Terminalia ivorensis* (3rd), *Cordia millenii* (4th), and *Alstonia boonei* (5th). The lowly ranked include *Daniella ogea* (33rd), *Cleistopholis patens* and *Tectona grandis* (34th), *Terminalia catappa* (36th), and *Parinari sp.* / *Chrysophyllum albidum* (37th). These species were prominent because of their usefulness in various aspects of rural livelihood including food, shelter, medicine, fuel-wood for cooking, and income generation. Given the high spate of deforestation and land conversion in the reserve, the need for further studies to ascertain the impact of land use change on the populations of the key livelihood tree species and probable consequences for their conservation, is emphasized.

Keywords:

Rural livelihood, trees, land use change, biosphere reserve

INTRODUCTION

Livelihood has been defined by the Department for International Development (DFID) to comprise the capabilities, assets which include material as well as immaterial and activities required for a means of living (Haramatta, 2000). Sustainable livelihoods have been and continued to be the driving force of human survival strategies. This is particularly so when people, largely of the extractive occupations interact with their natural environment, with the aim of meeting their basic material needs of food, clothing and shelter (Foli *et al.*, 1997).

When governments signed the Millennium Declaration in 2000 and committed themselves to achieving the Millennium Development Goals, they agreed to halve the number of people living in extreme poverty by 2015. The forest as a natural asset contributes immensely to the total well-being of forest fringe populations. According to World Bank (2001), more than 25% of the world's population – an estimated 1.6 billion people – rely on forest resources for their livelihoods, and of these, almost 1.2 billion live in extreme poverty; lacking the basic necessities to maintain a decent standard of living: sufficient and nutritious food, adequate shelter, access to health services, energy sources, safe drinking water, education and a healthy environment (FAO, 2006). In Sub-Saharan Africa, forest goods and services are extremely important for rural livelihoods, providing food, medicine, shelter, fuel and cash income (Kaimowitz, 2003).

The human population in Omo Biosphere Reserve is predominantly rural and the people depend to a large extent on forest resources for their livelihoods. However, despite the rapid transformation of its natural forest cover to other land use/land cover types like monoculture plantations of exotic tree species and arable farms, no empirical study has been carried out to ascertain the impact on the populations of key livelihood tree species and the ecological implications for their future regeneration. The study documented and prioritized tree species that contribute most to rural livelihoods in the reserve and their uses with a view to providing a baseline data for further investigations into the impact and ecological consequences of land use changes on their populations.

MATERIALS AND METHODS

Description of the study area

Omo Biosphere Reserve is located between latitudes 6° 35' to 7° 05' N and longitudes 4° 19' to 4° 40' E in the South-west of Nigeria (Ojo, 2004); about 135 km north-east of Lagos, about 120 km east of Abeokuta and about 80 km east of Ijebu Ode (Ola-Adams, 1999). The reserve shares a common boundary in its northern part with two other forest reserves – Ago Owu and Shasha in Osun State. It also has a common boundary with Oluwa Forest Reserve in Ondo State (Karimu, 1999); and covers 130,500 hectares of land (Ola-Adams, 1999; Ojo, 2004).

Data collection

Structured questionnaire was distributed in ten randomly selected enclaves – Abeku, Etemi, Temidire, Grace Camp/Fowowa, Osoko, Mile 1, Oloji, Aberu, Abakurudu and Ajegunle, within the reserve, to identify and document the key livelihood tree species and their uses. Twenty adults were randomly selected in each enclave for the administration and completion of questionnaire. This gave rise to a sample size of 200 respondents. Respondents were asked to list 10 tree species that contribute most to their livelihoods in decreasing order of importance, and state their uses. The user-preference approach was used to rank the species. The species were scored on a scale of 1 -10 points such that the most preferred by each individual scores 10 points while the least preferred scores 1 point. Then the total score for each species was derived by adding the points from individual respondents for that particular species; and this was used to rank the species.

RESULTS

A total of thirty-eight key livelihood tree species were documented and prioritized (Table 1). The five most highly ranked species were *Khaya ivorensis* ranked (1st), *Nauclea diderrichii* (2nd), *Terminalia ivorensis* (3rd), *Cordia millenii* (4th), and *Alstonia boonei* (5th). The most lowly ranked species were *Daniella ogea* (33rd), *Cleistopholis patens* and *Tectona grandis* (34th), *Terminalia catappa* (36th), and *Parinari sp./Chrysophyllum albidum* (37th).

Table 1: Checklist of key livelihood tree species

S/N	Species	Common or local name	No. of times mentioned	% of total number of respondents	Total score	Rank
1	<i>Khaya ivorensis</i>	Lagos mahogany	155	77.5	1295	1 st
2	<i>Nauclea diderrichii</i>	Opepe	155	77.5	1240	2 nd
3	<i>Terminalia ivorensis</i>	Black afara	110	55	850	3 rd
4	<i>Cordia millenii</i>	Omo	100	50	690	4 th
5	<i>Alstonia boonei</i>	Pattern wood	60	30	465	5 th
6	<i>Terminalia superba</i>	White afara	65	32.5	375	6 th
7	<i>Erythropheum suaveolens</i>	Erun-obo	65	32.5	330	7 th
8	<i>Mangifera indica</i>	Mango	35	17.5	265	8 th
9	<i>Entandrophragma utile</i>	Jebo	40	20	260	9 th
10	<i>Anarcadium occidentale</i>	Cashew	35	17.5	260	9 th
11	<i>Milicia excelsa</i>	Iroko	50	25	255	11 th
12	<i>Lophira alata</i>	Ekki	35	17.5	190	12 th
13	<i>Triplochiton schleroxylon</i>	Obeche	40	20	190	12 th
14	<i>Piptadeniastrum africanum</i>	Agboyin	30	15	175	14 th
15	<i>Theobroma cacao</i>	Cocao	25	12.5	145	15 th
16	<i>Mitragyna ciliata</i>	African linden	30	15	140	16 th
17	<i>Mansonia altissima</i>	Mansonia	25	12.5	140	16 th
18	<i>Ceiba pentandra</i>	Kapok tree	25	12.5	130	18 th
19	<i>Enantia chlorantha</i>	Osopupa, Yaru	20	10	130	18 th
20	<i>Cederela odorata</i>	Honduras cedar	20	10	110	20 th
21	<i>Anthonotha macrophylla</i>	Abara	20	10	110	20 th
22	<i>Eleais guineensis</i>	Palm tree	15	7.5	110	20 th
23	<i>Citrus sinensis</i>	Sweet orange	15	7.5	100	23 rd
24	<i>Cola nitida</i>	Kola nut	10	5	90	24 th
25	<i>Buchholzia coriacea</i>	Wonderful kola	20	10	85	25 th
26	<i>Gmelina arborea</i>	Gmelina	15	7.5	80	26 th
27	<i>Entandrophragma angolense</i>	Ijebo	10	5	75	27 th
28	<i>Nesogordonia papaverifera</i>	Danta	15	7.5	55	28 th
29	<i>Newbouldia laevis</i>	Boundary tree	10	5	55	28 th
30	<i>Citrus aurantifolia</i>	Lime	10	5	55	28 th
31	<i>Garcinia kola</i>	Bitter kola	5	2.5	40	31 st
32	<i>Azadirachta indica</i>	Neem	5	2.5	40	31 st
33	<i>Daniella ogea</i>	Ogea	5	2.5	35	33 rd
34	<i>Tectona grandis</i>	Teak	5	2.5	25	34 th
35	<i>Cleistopholis patens</i>	Apako	5	2.5	25	34 th
36	<i>Terminalia catappa</i>	Indian almond	10	5	20	36 th
37	<i>Chrysophyllum albidum</i>	African star apple	5	2.5	15	37 th
38	<i>Parinari sp.</i>	Abere	5	2.5	15	37 th

The key livelihood tree species are used for different purposes (Table 2). These include: the treatment of different ailments such as malaria, typhoid fever, swollen bodies, body pain, dysentery, gonorrhoea, low

sperm count, stomach ache, cough, ulcer, pneumonia, convulsion, male impotence, rheumatism, etc.; timber; construction of handles for farm implements; oil; antibiotics; food; income generation; etc.

Table 2: Uses of the Key Livelihood Tree Species

S/N	Species	Uses
1		Timber for furniture and construction purposes, bark/leaves boiled in water and drunk to treat malaria/fever/swollen bodies/body pains/dysentery/stomach ache and for blood cleansing; bark boiled with water and used to bath newly born babies for prevention of sicknesses; branchlets used for fuel wood.
2	<i>Khaya ivorensis</i> <i>Nauclea diderrichii</i>	Timber for furniture and construction purposes, Bark cooked in water or soaked in gin and drunk to treat fever/body pain/stomach ache; bark/leaves of <i>Baphia nitida</i> cooked and drunk to treat hernia; fruits eaten to clear throat against cough; sweet juice from fruit used as mouth-freshener; fuel wood; bark + bark of <i>Terminalia ivorensis</i> soaked in gin and drunk to cure typhoid fever.
3	<i>Terminalia ivorensis</i>	Timber for furniture and construction purposes; powdered bark used to treat ulcer, cut, sore and wound; cooked bark drunk to treat malaria/fever/pains/dysentery.
4	<i>Cordia millenii</i>	Timber for furniture and construction purposes; fuel wood; bark/root cooked with water or soaked in gin and drunk to cure fever, relieve pain and to stop vomiting; ground bark/shear butter used to treat cough.
5	<i>Alstonia boonei</i>	Bark/native pepper soaked in cold water for 2 days drunk to treat typhoid fever; bark alone cooked in water and drunk to treat malaria/fever; wood used to construct doors/frames/plywood and for decking.
6	<i>Terminalia superba</i>	Timber for furniture and construction purposes; fuel wood; bark also boiled and taken against malaria.
7	<i>Erythroleum suaveolens</i>	Bark boiled in water and drunk to treat convulsion; timber for furniture and construction purposes.
8	<i>Mangifera indica</i>	Food/source of vitamin and income; bark and leaves cooked in water and drunk to treat malaria/fever; bark/leaves/leaves of <i>Azadirachta indica</i> cooked in water and drunk to relief body pain.
9	<i>Entandrophragma utile</i>	Bark boiled in water or soaked in gin and drunk to treat malaria/guinea worm/dysentery and eye problems; blood supplement; fuel wood.
10	<i>Anarcadium occidentaleis</i>	Fruit/seed eaten as food/source of vitamin, bark/leaves cooked and drunk to clear throat against cough/malaria/fever; Juice from fruit used as tongue-cleanser.
11	<i>Milicia excelsa</i>	Timber for furniture and construction purposes; poles.
12	<i>Lophira alata</i>	Timber for furniture and construction purposes including rails and bridges; bark boiled in water and drunk to treat convulsion.
13	<i>Triplochiton Schleroxylon</i>	Timber for furniture and construction purposes; bark used to treat malaria/fever; fuel wood.
14	<i>Piptadeniastrum africanum</i>	Bark decoction drunk to expel worm, treat cough, headache, mental disorder, stomach ache and male impotence; fuel wood; timber for furniture and construction purposes.
15	<i>Theobroma cacao</i>	Seeds sold to generate income; bark cooked in water and drunk as blood booster; ground seed mixed with pap and taken as blood booster.
16	<i>Mitragyna ciliata</i>	Timber for furniture and construction purposes; leaves used to wrap and preserve kola nuts; leaves boiled and taken against waist pain.
17	<i>Mansonia altissima</i>	Timber for furniture and construction purposes; firewood; bark used to treat malaria.
18	<i>Ceiba pentandra</i>	Root boiled in water or soaked in gin and drunk to treat rheumatism; wood used for decking of buildings; tender leaves eaten and used to prepare soup.
19	<i>Enantia chlorantha</i>	Bark cooked or soaked in gin and drunk to cure yellow/typhoid fever and malaria; immature fruits pounded, cooked and eaten with soup to refresh the body.
20	<i>Cederela odorata</i>	Timber for furniture and construction purposes; fuel wood
21	<i>Anthonotha macrophylla</i>	Fuel wood; wood used for making handles for weeding hoes; leaves used for wrapping.
22	<i>Eleais guineensis</i>	Palm oil, broom, palm wine; palm kernel oil drunk/rubbed on the head to cure headache/ convulsion in children, also drunk to cure cough, neutralize poison; rubbed on charms to render them impotent; bark boiled in water and taken as antibiotics.
23	<i>Citrus sinensis</i>	Fruit taken as source of vitamins; fruit sold to generate income;
24	<i>Cola nitida</i>	Seed sold to generate income, seed eaten as a stimulant to prevent sleep.

25	<i>Buchholzia coriacea</i>	Fresh seed cut into two and rubbed on the forehead to treat headache; cut seed soaked in gin and drunk to treat stomach upset; cut seeds soaked in gin for 2 days and drunk to cure gonorrhoea.
26	<i>Gmelina arborea</i>	Timber; pole, pulp; bark soaked in cold water and taken against stomach ache.
27	<i>Entandrophragma angolense</i>	Timber; bark cooked and drunk to treat malaria.
28	<i>Nesogordonia papaverifera</i>	Seed used to prepare soup.
29	<i>Newbouldia laevis</i>	Leaves used as soup thickener, and to crown kings.
30	<i>Citrus aurantifolia</i>	Fruit taken to cure stomach ache; leaves/fruits cooked and drunk to cure malaria/fever.
31	<i>Garcinia kola</i>	Twigs used as chewing stick; seeds are chewed to neutralize poison, treat cough, stomach ache; seeds and seed-powder used to scare snakes.
32	<i>Azadirachta indica</i>	Leaves cooked and drunk to treat malaria/fever.
33	<i>Daniella ogea</i>	Timber for construction purposes; exudates when dry becomes stone-incense used to ward-off evil spirits and to cure pneumonia.
34	<i>Tectona grandis</i>	Timber for construction purposes; pole.
35	<i>Cleistopholis patens</i>	Bark soaked in cold water and drunk/used to bath by pregnant women to aid delivery.
36	<i>Terminalia catappa</i>	Leaves cooked in water and drunk as blood booster.
37	<i>Chrysophyllum albidum</i>	Fruit taken as source of vitamins and sperm booster; generates income.
38	<i>Parinari sp.</i>	Seed ground and mixed with water/oil and given to children to treat stomach ache or rubbed on children to stop convulsion; seeds ground and mixed with shear butter and rubbed on swollen bodies to treat them; Seeds cut/soaked in gin and drunk to treat hernia.

DISCUSSION

Sustainable livelihoods have been and continued to be the driving force of human survival strategies. The identified key livelihood tree species are used by the rural people to support various aspects of their livelihoods including food, shelter, medicine, fuel-wood for cooking, and income generation. The forest as a natural asset has been known to contribute immensely to the total well-being of forest fringe populations. Kaimowitz (2003) also reported that in Sub-Saharan Africa, forest goods and services are extremely important for rural livelihoods, providing food, medicine, shelter, fuel and cash income.

Apart from *Nauclea diderrichii* which is an indigenous species, none of the exotic plantation species contributing to land use change in the reserve was ranked among the first fourteen of the thirty-eight key livelihood tree species. For instance, *Theobroma cacao* ranked 15, *Gmelina arborea* 26, and *Tectona grandis* 34. Although, *Theobroma cacao* is known to contribute immensely to rural livelihood in the study area, most of the rural dwellers in the reserve do not have the wherewithal to establish and manage cocoa plantations. This probably explains why only about 13% of the sampled population mentioned it. The fact that the major plantation species (*Gmelina arborea* and *Tectona grandis*) in the reserve were lowly ranked indicates that they contribute little to the livelihoods of the rural dwellers. WRM (2003) observed that large-scale plantations consisting of either fast growing trees such as eucalyptus and pines or other species generate most negative impacts, both in social and environmental terms.

Most of the highly ranked key livelihood tree species are known timber species. However, it must

be noted that the majority of them were ranked high by the rural dwellers because of non-timber benefits, especially their medicinal properties. Most of them argued that "health is wealth" and that someone must be healthy for him to do well in any aspect of life. The rural dwellers use these species to treat different ailments including the prevalent malaria and typhoid fever, dysentery, convulsion, gonorrhoea, male impotence, ulcer, cough, to mention a few. Many also sell their root, bark and leave decoctions/concoctions to generate income.

The high value placed on medicinal trees by the rural dwellers may probably be as a result of inadequate health care facilities in the reserve. Galabuzi *et al.* (2010) observed that traditional medicine is very important in primary health care delivery, and that its use is widespread in developing countries of Africa, Asia and Latin America. However, the remarkable land use change in the reserve through deforestation and conversion may constitute a big threat to public health through its negative impact on populations of tree species upon which primary health care depends. A more worrisome situation is the link between deforestation and emerging infectious diseases (EIDs). An increasing number of studies in EIDs, point to changes in land cover and land use, including forest cover change - particularly deforestation and forest fragmentation, along with urbanization and agricultural intensification, as major factors contributing to surge of infectious diseases (Wilcox and Ellis, 2006). The first plague-causing pathogens such as smallpox are believed to have originated in Tropical Asia early in the history of animal husbandry and large-scale forest-clearing for permanent cropland and human settlements (McNeil, 1976). Given the negative impact of deforestation on

the populations of medicinal plants, and its link with emerging infectious diseases, the vulnerability of the rural dwellers in the reserve, cannot be questioned.

CONCLUSION AND RECOMMENDATIONS

The study has succeeded in documenting and prioritizing thirty-eight key livelihood tree species in the reserve. Although, the highly ranked key livelihood tree species are mainly known timber species, the very high value placed on them was because of their non-timber benefits especially medicinal attributes. The fact that the major plantation species (*Gmelina arborea* and *Tectona grandis*) in the reserve were lowly ranked indicates that they contribute little to the livelihoods of the rural dwellers. Given the high spate of deforestation and land conversion in the reserve, the need for further studies to ascertain the impact of land use change on the populations of the key livelihood tree species and probable consequences for their conservation, is emphasized. Since studies have linked EIDs to land use/land cover changes, it is imperative to investigate the nature of diseases suffered by the inhabitants of the reserve and the causal-pathogens.

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