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TRADE IN TANZANIA**

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Corresponding author:

Dilys Roe, International Institute for Environment and Development (IIED),
3 Endsleigh Street, London WC1H 0DD, UK
dilys.roe@iied.org

Additional authors:

Simon Milledge and **Josephine Mremi**, TRAFFIC – East/Southern Africa, Tanzania Office
C/o WWF Programme Office, PO Box 63117, Dar es Salaam, Tanzania

Simon Mosha, Tanzania Forest Conservation Group, PO Box 23410, Dar es Salaam, Tanzania

USING PARTICIPATORY TECHNIQUES TO OBTAIN LOCAL PERSPECTIVES ON WILDLIFE TRADE IN TANZANIA

Dilys Roe, Simon Milledge, Josephine Mremi and Simon Mosha

ABSTRACT

The local-level impacts of wildlife trade regulations have been largely over-looked in national and international policy-making processes despite the important and often critical role that wild resources can play in local livelihoods – particularly of the rural poor. Participatory techniques present a useful complement to traditional quantitative research, allowing the views of often marginalized groups to be captured. A variety of techniques were employed in two villages bordering the Amani Nature Reserve in order to determine the importance of wildlife resources; the significance of wildlife trade as a livelihood activity compared to other activities; and the impact that resource use restrictions have had on local income earning opportunities and on other livelihood components. Overall, wildlife access and trade restrictions in the East Usambara Mountains have had a significant financial effect on local people. However, villagers also highlight *non-financial* effects of regulations – both positive and negative. This type of information is not generally available through quantitative research methods since non-financial impacts are, by their very nature, difficult to quantify. Nonetheless, these kinds of impacts can be as significant, if not more so, than purely economic effects.

Key words: wildlife trade, trade regulations, rural livelihoods, participatory techniques

Introduction

Many rural households in developing countries depend heavily on wildlife resources, both plants and animals, for subsistence purposes and income generation. Indeed, many rural households derive a significant part of their cash income from sales of wildlife products. In most cases this commercial trade in wildlife supplies markets within the country where the products originated. For some wildlife species

and products, however, a significant segment (if not the majority) of products traded are ultimately destined for foreign markets.

Over the last decade or so, concerns have been raised that wildlife trade controls and resulting changes in trade patterns can have a negative impact on the livelihoods of those earning an income as a result of wildlife harvests, and specifically the rural poor. Some have argued that not only do such controls reduce the actual or potential economic benefits that could be realised from sales of wildlife products, but they also have little positive or even a negative impact on the conservation status of the species concerned.

Research examining the impacts of trade controls and specifically CITES has, to date, focused primarily on the effectiveness of these controls in reducing the threat to species posed by international trade. Although the rhetoric surrounding the need to secure basic benefits for people living close to wildlife has been expanding since the early 1990s, far less research attention has been given to the impacts on livelihoods of conservation-motivated trade controls such as those required under CITES.

In this paper we describe a number of participatory techniques that were used to determine the importance of wildlife trade to local livelihoods in the East Usambara mountains, north-east Tanzania, and the impacts that trade restrictions have had on them.

Study Site

The East Usambara mountains in north-east Tanzania form part of a crescent-shaped chain of mountain blocks running from the Taita Hills in Southern Kenya to the Mahenge Mountains in Southern Tanzania, collectively known as the Eastern Arc Mountains. The coastal forests of the mountains are noted for high levels of species endemism and biodiversity and are of global importance as one of the 21 biodiversity hotspots listed by Conservation International. They are

also nationally important in Tanzania for large-scale agriculture (particularly tea and coffee estates) water catchment functions, hydro-electricity and, in the past, for timber.

Much of the now fragmented forests are designated as Forest Reserves, and fall under the authority of the Forest and Beekeeping Division, within the Ministry of Natural Resources and Tourism. However, inadequate resources to implement active and sustainable forest management, has meant that parts of these Reserves have been significantly degraded.

Amani Nature Reserve, is the first and so far only, new category of protected area in Tanzania which affords a higher level of protection than the Forest Reserves, similar to that of a National Park, but remains under the jurisdiction of the Forest and Beekeeping Division rather than TANAPA – the National Parks Authority. Amani Nature Reserve was proposed in 1988 and gazetted in 1997 for the specific purpose of conserving biodiversity. It covers an area of 8380 ha, including just over 1,000 ha of forest owned by private tea companies and a botanical garden.

Using Participatory Techniques

Participatory techniques present a useful complement to traditional quantitative research, allowing the views of often marginalized groups to be captured through methods which are based on visual representation rather than on the written word. Such techniques can both stimulate debate and facilitate the involvement of those who often do not speak out in structured interviews or consultations (but whose livelihoods are under discussion) as well as recording the results. Participatory methodologies are by necessity flexible and adaptive to local conditions.

A variety of techniques were employed in two villages bordering the Amani Nature Reserve in order to determine the importance of wildlife resources; the significance of wildlife trade as a livelihood activity compared to other activities; the impact that resource use restrictions have had on local income earning opportunities and on other livelihood components. Many of the techniques described in this paper could be adapted to other studies where local perspectives are critical to understanding the impact of projects, programmes and policies implemented at a higher level.

Prior to conducting the research, letters were sent to the village chairmen requesting permission to hold the meetings and asking them to select a group of between 30 and 40 people - including men, women, elders and youths – involved in trade in medicinal plants, animals or timber. The majority of the exercises were carried out with the whole group present and then followed up with interviews with individuals or with a small (but equally representative) group of 4 or 5 people in order to cross-check information and to clarify any inconsistencies in the data obtained.

Importance of Forest Resources to Local Communities

Villagers were asked to name forest resources that were important to them. Once a list had been drawn up a simple “ranking” exercise was conducted in which villagers were asked which of the resources they had identified was the most important, which was the next most important and so on, as well as the uses of each of the resources identified. The results are presented in Table 1 and show that forest resources are highly valued, reflecting the villages’ proximity to reserved and unreserved forest land, their isolation from urban influences and their relatively high reliance on both forest products and services. Both villages acknowledged the forest’s influence over climate – particularly rainfall - and the subsequent knock-on effects on agricultural seasons. Most forest products are valued for subsistence use but a number have commercial value. Timber is valued both for its commercial trade value and for its use in the construction of houses and for making furniture. While some wild animals are used for food (mainly primates and mammals) the sole use of the majority is the international wildlife trade.

Relative Significance of Different Livelihood Strategies for Different Stakeholders

In an earlier visit to the villages, to prepare for this study, villagers had been asked to identify their major occupations and sources of income. Agriculture and livestock (subsistence production and cash sales) are the main occupations in the East Usambara villages in terms of time spent and overall numbers of people involved. They are also the most important income generating activities. However, no individuals or households specialize in just one activity and other important elements include formal employment - mainly on one of the large tea estates in the area - and self-employment in some form of small business. Of the business activities, operation of small shops, bars and restaurants were considered the most important, followed by trade in timber and medicinal plants. Sale of live and dead animals for international trade was identified as one of the more minor income-generating activities alongside the sale of firewood and tree seedlings. However, different stakeholder groups (women, men, youth and elders) are involved to greater and lesser extents in the activities noted above and while wildlife-related trades may not appear to be that important overall in the villages they can be significant activities for certain groups.

In order to determine which activities were the most significant for each group a matrix scoring exercise was devised whereby six activities (agriculture, formal employment, small businesses, timber trade, animal trade and medicinal plant trade) were listed along the horizontal axis and the four stakeholder groups were listed along the vertical axis (Plate 1). Each group was given a number of beans and was asked, in turn, to place the beans on the various squares of the matrix according to the number of people involved in each activity, the amount of time spent on each activity, and the amount of income generated from each activity. Village records were used to determine the size of the working population in each village and the average annual household income number in order to provide baseline data against which to assess the significance of the results obtained from the matrix scoring exercise.

This exercise was particularly valuable in providing a mechanism for the voices of those who do not often speak out (particularly women) to be heard. Allowing each group to rank their own activities generated some interesting dynamics within the meeting. In one village, after the women had placed their beans on the matrix where they thought appropriate, a man stood up and rearranged them. This caused much laughter amongst both men and women, the man was shouted down, called a woman and, after the women replaced the beans in their original positions, the man did not try to intervene again! If just the men had been involved in the meeting and had been asked to provide information on the women's activities, a quite different picture would probably have emerged.

The results of the exercise showed that agriculture (preparing land, sowing, harvesting and selling) is the most important activity for women in terms of the relative numbers of people involved, the amount of time spent and the amount of income earned. Women do not directly participate in the trade in live and dead animals or in timber. Small numbers of women spend limited time collecting medicinal plants but this is less important than formal employment or operation of small businesses such as shops and bars. Similarly, agriculture is the most significant activity for men, followed by operation of small businesses, but men are also involved in the timber trade (pit sawing and acting as middlemen) and to a lesser degree, in collecting and selling animals and medicinal plants. Of the four groups, collection and trade in live and dead animals is most important to the youth, although even for this group it is less important than employment on tea estates and involvement in agriculture and small businesses. Youth also earn income from pit sawing and to a lesser extent in collecting medicinal plants. Village elders are most reliant on agriculture but are more involved than other group in practicing traditional medicine. Elders are also involved in the timber trade, almost exclusively as middlemen (Table 2).

In terms of wealth differentials, richer people (identified by locally defined criteria including: amount of land and types of crops grown; number of livestock; type of house (wealthier people can afford iron sheets for roofs and bricks rather than poles and thatch); ownership of a small business; ability to send children to school) were more likely to be involved in cash crop agriculture, business operations and livestock, while the poorer people were predominantly involved in subsistence agriculture - or producing

less valuable and lower quality crops; working for the wealthier people (e.g. as porters or keeping problem animals away from crops) and working on the tea estates. Involvement in wildlife trade is not restricted to richer or poorer groups, but tasks tend to be differentiated by wealth. In the case of the live/dead animal trade, collectors tend to be the poorer people while the richer ones act as middlemen.

For the timber trade, the poorer people act as cutters and porters while the richer people measure timber, pay labourers and again act as middlemen. The trade in plant medicines tends to be limited to relatively few people, some of who are termed traditional practitioners whilst others are termed witchdoctors. They tend to be poorer members of the community although some experienced elders are wealthier. Unlike the trades in timber and live/dead animals which covers collection/harvesting as well as transport and sale, the trade in plant medicines only involves dispensing and practicing, not collection from the wild.

Trends in Wildlife Trade Over Time

In order to examine changes in wildlife trade over time, villages were asked to construct a historical timeline. A long line was drawn either on a roll of paper or across a chalkboard and rather than just dates, key points in time were marked on the line. For this exercise the timeline was designed to run from 1960 to the present day so the key points included the Independence of Tanzania, the accession of different presidents and so on. The points need to be locally defined to ensure that they are relevant and might also, in other contexts, include years of drought, conflict and so on. Villagers were asked to describe the status of wildlife trade at different points along the timeline and to identify key interventions – positive and negative – that had affected their ability to engage in trade.

Villagers were then asked to list species that were traded at the peak of business activity and to rank these by availability, unit price and volume trade (Plate 2). This exercise was then repeated at a number of points along the timeline in order to examine changes over time and their links with the key interventions identified earlier. The trade in timber was examined at the present day and at its peak in

1985, before the sawmills were closed and mechanized logging banned in the East Usambara Mountains. The animal trade was examined at four intervals: in 1990 when the trade started up; in 1995 when business peaked; in 1998 after a period of decline and designation of the Amani Nature Reserve; and at present day after a further drop in business activity and a period of increased enforcement of resource use restrictions.

Timber

A total of 22 species of timber were recorded as the main species traded during the period 1985 to 2001. Out of these, a total of 17 timber species were listed in trade during 1985, and 21 in 2001. In 1985, the species of timber traded in largest quantities included mvule *Milicia excelsa*, East African camphor-wood *Ocotea usambarensis*, forest newtonia *Newtonia buchananii*, African red mahogany *Khaya anthotheca*, *Beilschmiedia kweo* and pod mahogany *Azela quanzensis*. At that time, timber species traded in the largest volumes were also the most expensive species. For example, *Milicia excelsa* and *Ocotea usambarensis* cost double that of Silky oak *Grevillea robusta*, which was traded in very low volumes.

The more expensive species in 1985 remain the higher priced species today. Prices for *Milicia excelsa*, *Beilschmiedia kweo* and *Ocotea usambarensis* are currently around TSH 4,800-5,400 (US\$ 5.5-6.2) per plank and double the price of the lowest value timber species. However, whilst the relative price of individual timber species has changed little, the relative volumes traded have shown a shift with some lower value species now traded in large quantities. For example, two lower value species, *Grevillea robusta* and wild jackfruit *Treculia africana*, are currently traded in relatively large quantities, whilst higher value species such as *Milicia excelsa* and *Khaya anthotheca* are now traded in relatively low quantities. Other low value species previously traded in low volumes or not at all but now included in commercial trade include *Allanblackia stuhlmannii*, *Maesopsis eminii*, East Indian walnut *Albizia lebeck*, Peacock flower *Albizia gummifera*, Wild kapok *Bombax rhodognaphalon*, Forest long-podded

albizia *Albizia schimperiana*, *Sclerocarya birrea*, Tall sterculia *Sterculia appendiculata* and *Pterocarpus mildbraedii*. Even mango wood *Mangifera indica* has entered trade in recent years.

The five timber species currently traded in the largest quantities are *Grevillea robusta*, *Beilschmiedia kweo*, *Treculia africana*, *Azelia quanzensis* and *Ocotea usambarensis*. According to the villagers' perceptions, four species have shown marked declines in availability in the wild over the past 15 years - *Milicia excelsa*, *Ocotea usambarensis*, *Khaya anthotheca* and *Newtonia buchananii*. These are slow-growing species with favourable construction characteristics. It is noticeable that these were amongst the four most selected timber species during the mid-1980s, pointing to overexploitation as the major cause for their decline. An example of the ranking exercise for one of the villages is given in Table 3.

Animals

With respect to the trade in live and dead animals, this only began to take off in line with demand in the early 1990s, some time after the trade liberalization and economic reforms started in the mid-1980s. At this time, trade involved relatively few species, including snakes, beetles, chameleons and *Tauraco fischeri*. Since the early 1990s, sales patterns of live animals from the East Usambara Mountains have matched national export patterns.

Bird and reptile exports continued to increase in volume up to 1994/95, matching increases in sales reported by villagers in the East Usambara Mountains. The number of species in trade greatly increased between 1992 and 1995 as the reptile trade picked up and later as demand grew for additional invertebrate species. Some rare beetles fetched particularly high prices. For example, the Goliath beetle *Goliathus orientalis* (Plate 3) (collector US\$ 3, middleman US\$ 6 and exporter US\$ 17), *Mecynorrhina* spp. (collector US\$ 2.5, middleman US\$ 5 and exporter US\$ 15) and *Argyrophegges kolbei* (collector US\$ 1, middleman US\$ 2.5 and exporter US\$ 4).

After 1995, bird sales ceased almost completely and bird export volumes have dropped considerably. Reptile exports have dropped slightly since 1995 and total reptile sales from the East Usambara Mountains have similarly declined over the same period. However, the number of reptile species caught and sold from the East Usambara Mountains increased after 1995. The quantity of some reptile species sold actually increased in volume, as did some invertebrates. The demand for, and sales of, amphibians started in 1995. Trade volumes have decreased further since 1998.

Whilst prices have dropped continuously in US\$ terms since 1990, the relative prices of different species have not changed significantly. In general, it is the rare, unusual or illegal species that command the highest prices, such as the Mesonarina beetle *Mecynorrhina* spp. (middlemen from East Usambara Mountains selling to exporters for up to TSH 15,000 or US\$ 31 in 1995), Usambara bush viper *Atheris ceratophorus* (up to TSH 25,000 or US\$ 41 in 1998) and Fischer's turaco, *Tauraco fischeri* (up to US\$ 20 in 1995). Several other beetles fetch high prices, whilst most chameleons are mid-range, with frogs and other invertebrates being the lowest priced. It is the higher priced species per specimen that have brought in the most income overall. .

Species traded in the highest quantities include beetles (especially *Megalorrhina harissi*, *Eudicella* spp. and *Argyrophegges kolbei*), chameleons (especially *Bradypodion fischeri* and *Chamaeleo deremensis*) and frogs (mainly *Hyperolius* spp.). According to villagers' perceptions, almost all species traded in the largest quantities are relatively common in the wild. Traders from one village reported that Fischer's turaco *Tauraco fischeri* numbers have grown considerably since the mid-1990s and it is a positive sign that the export ban implemented in response to declining wild populations has had a positive conservation impact. According to villagers' perceptions, with the exception of *Tauraco fischeri* there has been no significant change in the availability of different species. It can therefore be reliably assumed that changes in trade dynamics mentioned above have been largely due to a combination of regulatory and market changes rather than changes in their availability.

Unlike the timber trade, the trade in live animals has been affected by CITES regulations. A total of 306 animal species found in Tanzania are listed on the CITES Appendices, many of whom are found and traded from the East Usambara Mountains. In addition, a variety of local, national and international measures including trade restrictions and harvest controls have affected live/dead animal trade dynamics. However, as with the timber trade, it is the increased enforcement of regulations under the Amani Nature Reserve regulations since 1998 that has had the most impact on the villages. Since 1998, financial returns have reportedly dropped significantly, signifying that profits were being made from live/dead animals coming from within the Reserve. The existence of Amani Nature Reserve has resulted in the implementation and enforcement of use restrictions in such an efficient manner that species subject to trade bans (e.g. *Tauraco fischeri*) no longer have any market value.

Discussion

The local-level impacts of wildlife trade regulations have been largely over-looked in national and international policy-making processes despite the important and often critical role that wild resources can play in local livelihoods – particularly of the rural poor. At the CITES Conferences of Parties (CoPs) Observers directly representing rural stakeholders tend to be few and far between, although this was not the case at CoP 10 (Harare, 1997), where a significant effort was made by African-based NGOs to ensure such representation.

In Tanzania, the Wildlife Division within the Ministry of Natural Resources and Tourism is responsible for the issuing and monitoring of permits, licenses and quotas for all aspects of wildlife utilization, including live exports. Data on wildlife trade trends at the national level is collected both from customs records and from CITES permits and as a result conservation agencies such as TRAFFIC are able to compile a national-level picture of trends in wildlife utilisation. The use of participatory techniques enables comparative data to be collected at a local level and a fuller picture to be obtained of the socio-economic effects of national and international conservation policy.

It is interesting to note that local awareness of trade regulations focuses very much on the local level. When constructing the historical timeline and noting key interventions, villagers appeared to be totally unaware of international interventions such as CITES but have been significantly affected by the designation of the Amani Nature Reserve which has, in effect, effectively implemented and enforced and number of existing resource use restrictions. According to local perceptions, it is these access and harvest regulations that have had a greater impact than national and international trade regulations.

Overall, wildlife access and trade restrictions in the East Usambara Mountains have had a significant financial effect on local people. Average incomes for timber traders in one village have declined from US\$ 10,557 in 1985 to currently US\$ 426 per annum, whilst average incomes for live/dead animal traders have dropped from US\$ 830 in 1995 to currently US\$ 125. Local earnings have declined in terms of direct earnings from sales, employment and business opportunities. There has also been a knock-on effect on other small businesses (wildlife dependent and independent) both through a decrease in potential customers due to out-migration, reduced local and urban market access and a decrease in money circulation in the local economy. At the same time collective income in the form of the village sales tax has been affected since this is dependent on sales made. While not having to pay taxes might seem like a benefit to some, the villagers see it as a negative impact since the funds generated from village tax scheme are used to finance community development projects such as dispensaries. Declining cash incomes from the various wildlife trades have also resulted in reduced ability to pay school fees and decreased ability to purchase iron sheets for house roofing.

However, villagers also highlight *non-financial* effects of regulations – both positive and negative (Table 4). The most significant positive non-financial impact noted was the increased rainfall and available water as a result of regeneration of the forest following the timber trade harvest and export bans. During the intense logging of the seventies and eighties, the montane forests were severely degraded and this had impacted on local climatic conditions. Whereas previously there had been three rainy seasons and hence three agricultural seasons this had been reduced to two and the timing and duration of the rains

had altered. In recent years, villagers noted that the agricultural seasons were returning to normal and so food production had increased.

Villagers also noted however, that linked to the regeneration of the forest was an increase in wildlife and a subsequent increase in problem animals – particularly baboons – and this was having a negative effect on agricultural production since crops are destroyed and more time has to be spent chasing them away. However, this is only a temporary deterrent since villagers are allowed to go just 400 metres into the Reserve. In one village it was reported that the decline in timber trade has meant that older people who were previously involved have gone back to subsistence farming while younger people have moved away from the village in search of urban-based employment. However, the impact these problem animals have on subsistence agriculture means that this is not a satisfactory alternative for those who have moved to this from timber.

The withdrawal of the timber companies has also, for some, meant that roads to remote villages are no longer maintained and this has had a negative effect on people's ability to access markets for agricultural produce and other goods. Villages also noted that because they cannot cut trees along the side of the roads they do not dry quickly after rains and this has also contributed to their deterioration. Villages not solely dependent on timber companies for road construction and maintenance did note, however, that the decrease in heavy logging trucks had slowed the rate of damage to roads.

This type of information is not generally available through quantitative research methods since non-financial impacts are, by their very nature, difficult to quantify. Nonetheless, these kinds of impacts can be as significant, if not more so, than purely economic effects.

If we are to move beyond the rhetoric of providing benefits to wildlife-adjacent communities, far greater attention needs to be paid to listening to these communities rather than prescribing remedies based on experience from elsewhere. Techniques such as those described above

are a useful mechanism for increasing the voice of local people in decisions that have fundamental implications for the livelihoods of the rural poor.

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Biographical sketch

Dilys Roe is a Senior Research Associate in the Biodiversity and Livelihoods Group at IIED where she has worked since 1992. Research interests include rural livelihood aspects of wildlife management policies and practice and the linkages between tourism and sustainable development.

Simon Milledge is Senior Programme Officer, and Josephine Mremi is Research Officer, in the Tanzania office of TRAFIC-East/Southern Africa where their research is focussed on sustainable and legal natural resource use and its contribution to rural livelihoods.

Simon Mosha is Field Officer for the Tanzania Forest Conservation Group

Table 1: Important forest resources and their uses

RANK	RESOURCE OR PRODUCT	USE
1	Rain / water	Drink, agriculture
2	Firewood	Fuel
3	Poles	Housing
4	Timber	Housing, furniture, local and international trade
5	Medicinal plants	Medicines, local trade*
6	Wild plant foods	Food
7	Bush meat	Food
8	Honey	Food and some local and international trade
9	Wild fruits	Food
10	Live (or dead) birds, reptiles, amphibians and invertebrates	International trade

Notes: * There are rarely any sales beyond the village but occasionally people will come from cities in Tanzania (Tanga, Dar es Salaam or Dodoma) or Kenya (Nairobi) to be treated by a village healer or to buy a specific treatment / preparation.

Table 2. Relative importance of different wildlife trades to different social groups.

	Most important → Least important		
Women	Medicinals		
Men	Timber	Medicinals	Animals
Youth	Timber	Animals	Medicinals
Elders	Timber	Medicinals	

	Most important → Least important		
Timber	Men	Youth	Elders
Animals	Youth	Men	
Medicinals	Elders	Men / Women	Youth

Table 3. Ranking of timber species by availability, price and volume sold.

AVAILABILITY		PRICE		VOLUME	
1985	2001	1985	2001	1985	2001
<i>Milicia excelsa</i>	<i>Grevillea robusta</i>	<i>Milicia excelsa</i>	<i>Milicia excelsa</i>	<i>Milicia excelsa</i>	<i>Grevillea robusta</i>
<i>Cephalosphaera usambarensis</i>	<i>Azelia quanzensis</i>	<i>Ocotea usambarensis</i>	<i>Beilschmiedia kweo</i>	<i>Ocotea usambarensis</i>	<i>Beilschmiedia kweo</i>
<i>Azelia quanzensis</i>	<i>Cephalosphaera usambarensis</i>	<i>Khaya nyasica</i>	<i>Ocotea usambarensis</i>	<i>Newtonia buchananii</i>	<i>Treculia africana</i>
<i>Allanblackia stuhlmannii</i>	<i>Allanblackia stuhlmannii</i>	<i>Beilschmiedia kweo</i>	<i>Azelia quanzensis</i>	<i>Khaya nyasica</i>	<i>Azelia quanzensis</i>
<i>Newtonia buchananii</i>	<i>Maesopsis eminii</i>	<i>Newtonia buchananii</i>	<i>Khaya nyasica</i>	<i>Beilschmiedia kweo</i>	<i>Ocotea usambarensis</i>
<i>Ocotea usambarensis</i>	<i>Newtonia buchananii</i>	<i>Grevillea robusta</i>	<i>Treculia africana</i>	<i>Azelia quanzensis</i>	<i>Newtonia buchananii</i>
<i>Khaya nyasica</i>	<i>Beilschmiedia kweo</i>	<i>Azelia quanzensis</i>	<i>Newtonia buchananii</i>	<i>Grevillea robusta</i>	<i>Maesopsis eminii</i>
<i>Beilschmiedia kweo</i>	<i>Treculia africana</i>	<i>Cephalosphaera usambarensis</i>	<i>Grevillea robusta</i>	<i>Cephalosphaera usambarensis</i>	<i>Khaya nyasica</i>
<i>Maesopsis eminii</i>	<i>Khaya nyasica</i>	<i>Allanblackia stuhlmannii</i>	<i>Maesopsis eminii</i>	<i>Allanblackia stuhlmannii</i>	<i>Milicia excelsa</i>
<i>Treculia africana</i>	<i>Ocotea usambarensis</i>	<i>Maesopsis eminii</i>	<i>Allanblackia stuhlmannii</i>	<i>Maesopsis eminii</i>	<i>Allanblackia stuhlmannii</i>
<i>Grevillea robusta</i>	<i>Milicia excelsa</i>	<i>Treculia africana</i>	<i>Cephalosphaera usambarensis</i>	<i>Treculia africana</i>	<i>Cephalosphaera usambarensis</i>

Table 4. Positive and negative impacts of trade regulations on important livelihood components in the East Usambara Mountains.

RANKED LIVELIHOOD COMPONENTS	POSITIVE IMPACTS ON LIVELIHOOD COMPONENTS	NEGATIVE IMPACTS ON LIVELIHOOD COMPONENTS
WATER/RAIN	WATER/RAIN: Increased rain and available water as a result of improved forest cover.	JOB: Less employment in the timber sector (i.e. sawmill companies).
FOOD	EDUCATION: Greater conservation education and awareness on farming techniques, tree planting and energy-saving stoves. New primary school built at one village.	ACCESS TO MARKETS: Reduced market for fresh foods (after closing of sawmills), live animals and timber. Roads no longer maintained by timber companies so difficult to access markets for agricultural and other products.
HOUSING	HOUSING: Decrease in availability of wood has encouraged construction of better houses from bricks and cement.	FOOD: Agricultural output affected by crop destruction from baboons and bush pigs, resulting in more time spent on farms. Decreased availability of bush meat. Decrease in food due to inability to fell trees on farmland.
HEALTH	FOOD: More food produced because agricultural seasons have returned to previous state (i.e. two/three harvests per year).	HOUSING: Less suitable wood available for building doors, window frames and furniture. More difficult to build traditional houses using wood and poles.
EDUCATION	BUSINESS OPPORTUNITIES: New business opportunities in cardamom.	FIREWOOD: Limited access to reserve to collect firewood (400m maximum for two days per week).
FIREWOOD	COMMUNITY ORGANISATIONS: New community organizations started, including water conservation, tree planting and energy-saving stoves.	BUSINESS OPPORTUNITIES: Reduced opportunities since less circulation of money within village and therefore less money available to start up businesses.
TRANSPORT	TRANSPORT: Improved road conditions due to fewer heavy timber lorries.	EARNINGS: Reduced income especially from timber sales.
EARNINGS	COLLECTIVE INCOME: 20% income from Amani Nature Reserve tourism earnings started in 2001.	(LAND): Land appropriation by Reserve
ACCESS TO MARKETS	COMMUNICATIONS: Increased access to telephone since telephone line brought closer by Reserve.	EDUCATION: Some villagers not able to pay for school fees due to reduced earnings.
BUSINESS OPPORTUNITIES	LOCAL CULTURE: Cultural rites and beliefs maintained.	COLLECTIVE INCOME: Reduced village tax income from sale of wildlife resources.
JOB		TRANSPORT: Road quality declined - dries slowly since roadside trees are not cut. Transport opportunities reduced slightly after sawmills stopped.
COLLECTIVE INCOME		LOCAL CULTURE: Western influence damaging to Muslim culture, especially with regards to women's clothing.
ELECTRICITY		
COMMUNICATIONS		
COMMUNITY ORGANIZATION		
LOCAL CULTURE		

Plate 1: Matrix scoring exercise for assessing the significance of different livelihood activities to different stakeholder groups

Plate 2: Ranking species against a historical timeline

Plate 3: Goliath beetle and collector