"LOCAL PERCEPTIONS OF THE IMPACTS OF WILDLIFE TRADE REGULATION ON LIVELIHOODS: A CASE STUDY FROM TANZANIA"

Simon Milledge, Dilys Roe, Josephine Mremi and Simon Mosha

Submitted to the Journal of East African Natural History

ABSTRACT

The links between wildlife trade regulations and rural livelihoods was researched in three villages in the East Usambara Mountains, northeast Tanzania. The area is unique in terms of its biodiversity, and local communities show a high degree of dependence upon the natural resources for meeting basic livelihood needs (including income generation, health, food and security). The area experiences high levels of wildlife trade to local and international markets, which have been affected by a long history of wildlife trade interventions at local, national and international levels.

The various local, national and international trade and access interventions since the mid-1980s has affected the trades in timber, live and dead animals from the East Usambara Mountains, in addition to many other wildlife products. Changes in trade volumes, species composition, price structures and other dynamics are documented. Further, experience from the East Usambara Mountains clearly shows a mixture of positive and negative monetary and non-monetary implications of wildlife access and trade regulations at local, national and international levels. While the positive effects of regulation offset some negative impacts, the overall feeling in the villages studied is one of hardship since the trades started to decline.

According to local perceptions, wildlife access and harvest regulations have had a greater overall impact than national and international trade regulations. Evidence suggests that the effect of some trade regulations have actually led to significant positive impacts on local livelihoods, whilst subsequent wildlife access regulations have caused the most negative impacts. Market demand and business acumen are major factors influencing rural peoples' susceptibility to wildlife access and trade regulation. Finally, the relative importance and weighting of positive and negative livelihood impacts of wildlife access and trade regulations remains a challenging task, and this study discusses a few key issues.

STUDY AREA

Research was conducted in the East Usambara Mountains, part of the Eastern Arc Mountains, a crescent-shaped chain of ancient, isolated mountains stretching from southeast Kenya to southwest Tanzania. The climate is monsoonal and the area receives up to 2,000 mm rain per year in two distinct seasons (March-May and October-December). The long-term isolation of these remnant mountain forests and a monsoonal, humid coastal climate has resulted in species richness and endemism of global significance (Rodgers and Homewood 1982; Lovett 1989; Kingdon 1990; Lovett and Wasser 1993; WWF and IUCN 1994; Myers 1998; Myers et al., 2000).

In 1998, a total of approximately 113,400 people lived in the 54 villages of the East Usambara Mountains (Kessy 1998). The majority of inhabitants belong to the Sambaa tribe who are highly dependent on forest resources, and the local Sambaa language is notably rich in botanical and ecological terms (Johansson et al. 1997; Kessy, 1998; Fleuret, 1988; Härkönen and Vainio-Mattila, 1998; Desissa and Hamisy, 1999). Forest products and services include fuel wood (33 species), poles (35 species), withies (32 species), ropes (11 species), foods (46 species), medicines (185 species) and household utensils (83 species). Villagers also recognize the importance of forests for regulating hydrological processes and microclimate for agriculture. Subsistence agriculture consists of mixed cropping systems including shifting cultivation

The nearest large city is Tanga, with a population of around 200,000 whose water supply is dependent on the East Usambara Mountains via the Sigi River. The mountains are also nationally important in Tanzania for large-scale agriculture (particularly tea, coffee and sisal estates), hydro-electricity and, in the past, for timber. Since the end of the 19th century, over 50 per cent of the forest of the East Usambara Mountains has been cleared for commercial crops (coffee, tea), commercial and individual logging, forestry plantations and agriculture (Schmidt, 1989; Newmark, 1998). Fragmentation has resulted in just eight major patches of forest remaining of which 335 km2 (74 per cent) occurs within Forest Reserves. The East Usambara Mountains are unique in containing montane forest occurring at lower altitudes than any other mountain block in Tanzania, and a high proportion (54 per cent) of closed forest (Newmark 1998).

Three villages were selected for research since they provided an opportunity to research the links between wildlife trade regulations and rural livelihoods. The area is unique in terms of its biodiversity, local communities show a high degree of dependence upon the natural resources, and levels of wildlife trade have been affected by numerous wildlife trade and access interventions.

METHODOLOGY

Research was conducted during the latter half of 2001 using participatory techniques. Five villages were initially visited, followed by further, detailed work in three villages. These three villages were chosen due to the higher levels of trade in wildlife products traded to international markets and therefore affected by international as well as national regulations. The wildlife products sourced from the East Usambara Mountains and traded internationally include timber, live animals for the pet trade, and dead invertebrates sold to specialist collectors. Research into impacts of trade regulation focused heavily on the period from 1985 to 2001.

A variety of participatory techniques were employed in the villages 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 and trade restrictions have had on local livelihoods. The villages chosen had previously been exposed to participatory rural appraisals and were therefore sensitized to similar data collection techniques. These included community consultations, meetings with stakeholder groups, individual

interviews, transect walks, resource maps, ranking and matrix exercises (Roe et al., in progress).

RESULTS

Commercial activities based on wildlife resources in the East Usambara Mountains involve timber, wood products, live/dead animals, medicinal and ornamental plants. Wildlife trade interventions at local, national and international levels have included access, harvest and export bans and other regulatory measures affecting a range of species, land use and tenure systems. The products affected most by access and trade interventions in the villages researched are timber and live/dead animals (i.e. for the pet/collectors market). Key interventions affecting the local trades in timber and live/dead animals for export since 1985 have included restrictions to access, harvesting and sales, national export bans and changes in enforcement levels. The trade in live animals has also been affected by CITES regulations.

A whole range of conservation, financial and non-financial livelihood impacts were documented, as described in more detail below. It is also evident that regulatory measures affect different sectors of society due to the different roles in wildlife trade played by the rich and poor, by women, men, elder and youth. Men are most affected by timber trade regulations and youth most affected by live/dead animal trade regulations.

Conservation impacts of wildlife trade access and trade regulations

Despite the fact that wildlife trade regulations have mostly been imposed due to conservation concerns, there is little empirical evidence to show impacts of these regulations on the conservation status of species. Whilst biological surveys have been conducted over large areas, most have been determining baseline biogeographical data. With the notable exception of forest cover analyses, few repeated studies have been made in the East Usambara Mountains from which trends and impacts can be deduced. The East Usambara timber harvest ban and national hardwood export ban have led to reduced forest loss, which in turn as had a local effect on climate with a return to three rainy seasons per year instead of two. Whilst timber species that have declined most in availability were the most exploited species during the 1980s and 1990s, there is no evidence showing increasing volumes of harvestable, wild stands of these commercially important timber species. However, recent research indicates that the spread of exotic species is apparently assisting indigenous timber species to regenerate by creating the necessary shade, contrary to popular belief in the late 1980s (Binggeli 1989; Hall, 1995; Luukkanen 2001). Associated with this returning forest cover has been the return of other forest animals such as hornbills and primates.

Further, populations of Fischer's turaco have reportedly recovered to higher levels than during times of high harvest in the mid-1990s, partly attributable to the decline in rate of forest loss but largely due to their export ban. It seems that most live animal export quotas, particularly chameleons, are set at sensible levels and have not caused populations to decline according to villagers' perceptions. It is probably still too early to see the conservation impacts of the more recent gazettment of the Amani Nature Reserve,

although villagers feel that raised conservation awareness and education as a result of Amani Nature Reserve outreach programmes will have a positive effect.

Financial impacts of timber access and trade regulations

A total of 22 timber species were recorded as the main species traded during the period 1985 to 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 Afzelia 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, the latter traded in very low volumes. These species preferences closely matched other records from the late 1980s. Ruffo (1989) reports that pit sawyers were extremely selective and cut almost exclusively only four species - Khaya, Milicia, Newtonia and Ocotea. A list of plywood and timber species provided by SSM in the late 1980s also included Khaya, Newtonia and Beilschmiedia (Ruffo, 1989).

Since 1985, five access or trade regulations have affected timber trade dynamics in the East Usambara Mountains. In May 1986, a temporary logging suspension from the East Usambara Mountains was introduced under an Administrative Order from the Director of Forestry and Beekeeping. This was due to concerns over environmental degradation as a result of SSM operations (Hamilton and Bensted-Smith 1989). Two months later, SSM were granted permission to continue logging for a period of 18 months, but logging in montane forests stopped after December 1986 and logging from lowland forest at Kwamsambia ceased in June 1987. These logging suspensions did not seriously affect rural communities in the East Usambara Mountains since they were directed primarily at SSM. In 1987, a timber harvest ban was implemented in the East Usambara Mountains following a decline in key commercial timber species. Following the ban, large-scale harvesting decreased but smaller-scale harvesting and pit sawing continued, largely illegally. On the one hand, this was the start to greater benefits being accrued to local villagers since they perceived themselves as minor benefactors during SSM operations. On the other hand, this led to an increase in informal and illegal trade dynamics in reserved and unreserved land.

Pit-sawing was banned in Amani Division in 1989, again following concerns over sustainability. However, this ban was not mentioned in any of the villages, probably due to the subsequent School Desk Concession that permitted pit-sawing of trees that had been felled before the concession came into place in December 1990. In reality, the concession was not adhered to and widespread abuses and illegal activities occurred (Tye and Kimaro, 1992). Most trees were felled live and most timber sold for profit rather than making desks. Timber trade was not reported to have been affected by either the pit-sawing ban in Amani Division or the concession. Four years later in 1993, a national hardwood export ban was announced by Government Order in June 1993 following the 1992 Earth Summit. Tree felling in catchment areas, riverbanks and valleys was also banned. Affecting some 33 companies, this effectively prevented large-scale, commercial logging from continuing in the East Usambara Mountains and therefore helped to ensure

that access was largely restricted to the local villagers. However, villagers did not mention the ban having had a major negative impact on their livelihoods, probably because major sawn wood markets existed for construction and furniture inside Tanzania (especially Tanga and Dar es Salaam).

Amani Nature Reserve (ANR) was gazetted in 1997. Villagers claimed that a larger impact has been felt since 1998, especially reduced financial returns from timber sales. This is largely due to the more active enforcement of the Nature Reserve with assistance of FINNIDA through the East Usambara Catchment Forest Project. Indeed, the fact that financial profits have reportedly dropped significantly since 1998 signifies that significant returns were previously being made from timber coming from within the Reserve.

Lastly, villagers report that the increased timber license and permit fees since 1999 hinder many people from trading legally. In one village it was reported that license fees had increased from TSH 1,800 (US$ 56) per month plus TSH 500 (US$ 16) per cubic metre of wood removed from the forest to TSH 100,000 (US$ 114) for 6 months plus TSH 50,000 (US$ 57) per cubic metre. With an average annual household income of TSH 300,000 (US$ 342) villagers say they cannot afford to buy licenses at these prices. The fact that this is seen as an important issue nowadays indicates that the enforcement of ANR access seems to have effectively discouraged most timber traders to harvest illegally. However, the options for legal trade are affected by the high costs of license/permits and the short supply of commercially valuable timber from open land. During the period 1985 to 2001, several changes in timber trade dynamics have been witnessed, most notably an overall decline in volumes of timber traded, price increases (in local currency terms), and changes in species composition. All villages reported a lower overall volume of timber sold now compared to the peak activity in the mid-1980s, due to local harvest and trade restrictions in addition to reduced availability. For example, using estimations of weekly sales at different times of the year, one village reported approximately 41,600 planks sold in 1990 compared to only 3,640 in 2000. Current timber prices have increased 4.5 – 9.7 times the 1990 prices in local currency terms, matching local perceptions of rising timber prices (Table 1). However, average prices have remained the same in US$ equivalents (using exchange rates adjusted for inflation). This is surprising considering the reduced availability in the wild of the more valued species, although it is possible that timber is being undervalued at village level .

Table 1. Changes in average timber prices between 1990 and 2001.

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. For example, O. usambarensis grows at around one inch per annum (Anon, 1963). 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. Despite their scarcity, these valuable species remain the most expensive today, and 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. Linked to this decline in valuable species, timber traded has 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 lebbeck, 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.

These changes in trade dynamics have had mixed financial impacts on local communities. After large-scale commercial logging ceased in the mid-1980s, more local communities seemed to benefit financially in the short-term as they took advantage of direct access to the timber reserves and urban markets – albeit illegal in many cases. Previously, many outsiders were often brought in as cutters and carriers and there was limited scope for local people to be involved. However, over the longer term, negative financial impacts to the communities living in the East Usambara Mountains have been caused by a combination of factors, including lower overall volumes of timber sold, a decrease in the number of people involved in timber trade, lower overall village incomes from the timber trade, a higher proportion of cheap timber species in trade, and both decreased size and quality of planks. Timber traders currently amount to around 1 per cent of the entire working population. Although no more than 3-5 per cent of the working population received income from the timber trade in the later 1980s, they were amongst the highest wage earners and the subsequent decrease in profits are reported to have heavily impacted collective money circulation and village tax revenues. Average incomes for timber traders in Village B are currently US$ 426 per capita, down from US$ 10,557 in 1985. Similarly, average incomes for timber traders in Village C have declined from US$ 2,044 in 1990 to US$ 173 (Table 2). Collective village incomes from the timber trade declined by 98 per cent and 88 per cent for Villages B and C respectively. Nevertheless, timber traders still earn far more than the average income from agriculture (Table 4).

Table 2. Changes in earnings from the timber trade in Village C (US$).

Financial impacts of live/dead animal access and trade regulations

In the case of animals, villagers listed a total of 24 species in trade although the total number traded is undoubtedly much higher. Local trading from the East Usambara Mountains began to increase 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 Fischer's turaco Tauraco fischeri. Traders of live and dead animals from the East Usambara Mountains have experienced mixed financial fortunes since the early 1990s. The trade

peaked in the mid-1990s, with a mixture of international, national and local interventions, including trade restrictions and harvest controls, has affected trade dynamics. These have included CITES recommendations, national export quotas, Amani Nature Reserve, airline and importing countries' regulations. In addition, shifting market preferences has affected trade levels in the East Usambara Mountains.

Since the early 1990s, sales patterns of live animals from the East Usambara Mountains have matched national export patterns (Milledge, in progress). 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. Profits soared between 1990 and 1995 due to the much higher volumes and numbers of species traded, despite price declines. In 1994, as part of the CITES significant trade review process to identify species whose trade levels may pose a threat to their survival, primary recommendations to suspend trade pending confirmation of appropriate conservation action arose for two bird species found in the East Usambara Mountains – Tauraco fischeri and Brown-headed parrot Poicephalus cryptoxanthus (CITES Notification #1999/20). Tauraco fischeri was commanding high prices (US$ 20) in 1995 and was one of the most important income earners up until 1995 and then practically ceased to be traded thereafter. After 1995, bird sales ceased almost completely and bird export volumes have also dropped considerably.

Export volumes have also been affected by regulations enforced by airline companies and importing countries. As a result of sustainability and animal welfare concerns voiced in the early 1990s, many airline companies have increased their own transport restrictions and standards. Many airlines stopped transporting live birds altogether whilst others (such as British Airways, Ethiopian Airlines and Swiss Air) transport birds destined for zoos only. The majority of live wildlife exports from Tanzania are destined for the United States and Europe both of which have stricter domestic measures on wildlife imports than those laid down by CITES. In the EU, Commission Regulation (EC) No. 2087/2001 of 24 October 2001 'suspending the introduction into the Community of specimens of certain species of wild fauna and flora' has resulted in the imports of 15 bird and reptile species from Tanzania including seven from the Eastern Arc Mountains: *Falco fasciinucha, Poicephalus cryptoxanthus, Tauraco fischeri, Bubo vosseleri, Chamaeleo deremensis, C. werneri* and *Eryx colubrinus.*

Since 1995, reptile exports have dropped slightly 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 of all live animals from the East Usambara Mountains have decreased further since 1998, due to the heavier enforcement of ANR with assistance of FINNIDA through the East Usambara Catchment Forest Project. Indeed, the existence of ANR 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,

with some neighbouring communities almost completely halted trade in live and dead animals since the late 1990s.

In addition to the above regulatory measures, another important factor affecting trade dynamics in the East Usambara Mountains is shifting overseas market demand. For example, the rise in sales in beetles, chameleons and amphibians over the past decade has coincided with a corresponding increase in their consumer demand in Europe, North America and East Asia. On the other hand, the overseas market for many valuable beetles originating from the East Usambara Mountains started to become saturated in 1998, resulting in further declines in price and demand.

Species currently traded in the highest quantities include beetles (especially *Megalorrhina harissi*, *Eudicella spp*. and *Argyorphegges 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.

In general, it is the rare, unusual or illegal species that command the highest prices, such as the 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 *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. Profits increase almost exponentially going up the trading chain. Middlemen may receive almost double the amount received by collectors, whilst minimum export prices are a further six times greater. For the species listed in Table 3, retail prices average 12 times the minimum export prices and 146 times the original collector's price.

Table 3. Changes in animal prices in village B.

Whilst prices have stayed the same in local currency terms, they have dropped continuously in US$ terms since 1990. Prices declines were greatest for beetles. For example, prices for *Mecynorrhina spp*. dropped from US$ 21 per specimen in 1990 to US$ 10 in 1995 and down again to US$ 2 in 1998. Continued price declines, reduced demand in some species and access restrictions have caused profits to fall further since 1995. In Village B, the average income from the trade in live and dead animals declined from US$ 830 per capita in 1995 to just US$ 125 in 1998 (Table 4). At less than a

quarter of the average household income, this led to many traders - both middlemen and collectors - stopping the trade altogether in 1998 and 1999. In some cases, middlemen have bypassed payments to collectors by catching the animals themselves or greatly reducing payments to collectors. In Village B, the number of traders has declined by two-thirds between 1995 and 1998, and collective village income from the live/dead animal trades has decreased by 95 per cent. Currently, only around 1 per cent of the entire working population is involved in the animal trade, which earns less than the average income from agriculture.

Table 4. Aggregate changes in income over time from wildlife trade in Village B (US$).

Non-financial livelihood impacts of wildlife access and trade regulations

Some of the conservation and financial impacts detailed above have had knock-on effects in the three villages as have the regulations themselves (Table 19). The most significant positive non-financial impact, noted in all three villages, 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 1970 and 1980s the montane forests were severely degraded, impacting on local climatic conditions. Whereas previously there had been three agricultural seasons coinciding with rainfall patterns, this had been reduced to two and the timing and duration of the rains had altered. Hamilton and Macfadyen (1989) also give evidence of decreased annual rainfall reliability since about 1960 on a regional scale. In recent years, villagers noted that the agricultural seasons were gradually returning to normal and so food production had increased. Other positive, non-financial impacts include community organisations, greater conservation education and awareness on farming techniques, tree planting and energy-saving stoves; improved road conditions due to fewer heavy timber lorries; and benefits associated from the ANR including village income from tourism revenues and improved communications.

According to villagers' perceptions, some of the most significant negative impacts of trade, use and access regulations have been financial. Reduced employment, market access and business opportunities have reduced individual and collective incomes with knock-on effects on their ability to pay for other services and to provide important livelihood components, for example, purchasing medicines, paying school fees and purchasing land and housing materials (Roe et al., in progress).

Indeed, trade-offs exist for many livelihood impacts. Whilst reduced forest loss has benefited agricultural output, villagers also noted that linked to the regeneration of the forest was an increase in wildlife and a subsequent increase in problem (crop raiding) animals – particularly baboons. Furthermore, since the designation of ANR villagers have been very limited in their ability to chase problem animals away since they 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 but now the impact of the problem animals has meant that even this option is becoming increasingly less viable. As another example of trade-offs, while

villagers complain that they can no longer access or afford timber for construction, they also note that as a result they have learned to build superior houses from bricks. However, timber is still needed for doors, frames and for furniture.

Although the negative financial impacts of trade regulations appear to outweigh all else, it is interesting to note that when asked to identify and then rank important livelihood components, financial earnings did not feature very highly. The most important components were water, food, housing, education, health and fuel. However, additional income (over and above that needed to purchase essential supplies) is spent on more agricultural land (to grow more food), better housing and school fees. Therefore while cash income might not rank highly in itself, its importance is emphasized by the fact that earnings are spent maximizing the most important livelihood components.

DISCUSSION AND RECOMMENDATIONS

Experience from the East Usambara Mountains clearly shows a mixture of positive and negative monetary and non-monetary implications of wildlife access and trade regulations at local, national and international levels. While the positive effects of regulation offset some negative impacts, the overall feeling in the villages studied is one of hardship since the trades started to decline. The restrictions in place are development and conservation-motivated and a strong case can be argued for regulating timber harvesting since this had been proceeding at an unsustainable level with severed impacts on forest quality and cover. Approximately 50 per cent of unreserved forest disappeared from 1954 to 1978 (Johansson et al. 1997). However, it is also true to say that most of the degradation was brought about through large-scale mechanized logging by timber companies. Local people are now bearing the brunt of this and are unable to afford harvesting licenses and are not allowed to fell trees on public land (even on public agricultural land where the tree is inhibiting crop development). Conservation justifications can also be found for some of the animal species subject to trade restrictions. However, while only the threatened species are covered by international regulations the ban on collecting imposed within Amani Nature Reserve effectively bars access to the market for non-protected species and implements a total harvest ban on species which are protected but for which an export quota exists.

In general, the relative importance and weighting of positive and negative livelihood impacts of wildlife access and trade regulations remains a challenging task. In many cases, there is no direct or indirect financial value attached to livelihood impacts, which makes it even more difficult to rank their importance. A further difficulty lies in teasing apart the many different causal factors and cross-linked issues with respect to impacts of wildlife access and trade regulations. The temporal effects of regulations also vary considerably, highlighting the need for monitoring livelihood impacts over long time periods (Milledge et al., in progress). Other issues that have arisen from this research differing value systems, local and international dynamics, market access, business acumen and local control.

Impact of local versus international regulations

The impact of regulations at the local level is directly related to the perceived importance of an area or resource and the functions it provides. The subsistence nature of living means that land access rights, tenure and agricultural concerns have the greatest impacts on livelihoods. Regulations directly affecting resource access and subsistence living seem to have had the greatest impacts in the East Usambara Mountains. Indeed, one of the main problems experienced as a result of trade regulation and the gazettement of Amani Nature Reserve is the increased incidence of crop damage by primates. Evidence further suggests that the effect of some trade regulations have actually led to significant positive impacts on local livelihoods, whilst subsequent wildlife access regulations have caused the most negative impacts.

As to be expected, CITES has not had a major negative livelihood impact in the East Usambara Mountains although it has affected certain sectors of the community (e.g. turaco traders). It is important to note, however, that two key factors seem to contribute to this outcome - the degree of dependence on a particular trade and alternative trade options. In the case of those people who have suffered most from wildlife trade regulation, they tend to be members of the community with fewer alternative income-generating options and a higher dependence on the wildlife trade in the first place. The majority of villagers is heavily involved in agriculture and will always resort to cash and subsistence crops in times of hardship. Many other factors play their role in determining the relative effect of CITES measures at the local level, including overseas market influences, levels of enforcement and trade levels of non-CITES species. It is therefore conceivable that under different conditions, CITES could result in a much greater negative effect on local communities. In such a hypothetical scenario, if the adverse consequences of negative livelihood impacts are not fully understood and counter-measures in place, the knock-on social effects may actually work in opposition to conservation objectives.

One problem is the general lack of available information regarding these different scenarios, in particular the interface between CITES measures, national export bans, airline companies' regulations, importing countries' regulations and changing international market demands. There is also a dearth of comparative analyses of relevant factors influencing livelihood impacts at the household level, including different land tenure and access rights, levels of agriculture and land use and settlement practices, distance and influence of urban markets, wealth status, levels of law enforcement and value systems.

Market and regulation awareness

In general, communities in the East Usambara Mountains have a high awareness of local wildlife trade and land access restrictions, particularly those concerning the Amani Nature Reserve and other forest reserves. This matches the results of a study conducted in 1994 in which 95 per cent respondents from 14 villages were aware of Forest Reserves (Kajembe and Mwaseba 1994). However, villagers are much less aware of international markets and regulations - including CITES - which makes them more susceptible to changes in regulation and especially market dynamics. A good example of this is the trade in live/dead animals for pet/collectors markets. At the global level, the decline in

market demand for live birds during the mid-1990s coincided with (or caused) a rise in reptile and amphibian trades. Thus, shifting consumer preferences and market dynamics have helped ensure that people involved in the capture and sales of live animals have continued to stay in business by simply shifting from selling birds to reptile, amphibian and invertebrate trading. In fact, these changing market dynamics have probably led to more benefits being felt in the East Usambaras than the West Usambaras since the former contains many more commercially important reptile species and historically has played a lesser role in the bird trade. Whilst villages in the East Usambara Mountains inadvertently benefited from the shift in trade towards reptiles, amphibians and invertebrates, they are totally unaware of current shifts in market dynamics with respect to invertebrates. Unlike the majority of live exports that are destined for the pet trade, most dried beetles are destined for the specialist collectors' market. Demand for beetles from the Usambara Mountains has recently dropped since the limited market has been saturated, whilst demand has increased from other unexploited mountain ranges. Beetle traders from the East Usambara Mountains are unaware of these market shifts and are therefore more likely to suffer the consequences in the near future.

Local control

From the era of mechanized logging up to present day management of the East Usambara catchment project and Amani Nature Reserve, villagers surrounding the Reserve have only experienced minor employment opportunities and roles in decision-making. Whilst many villages have been included in planning processes using participatory techniques, there has been little ongoing local participation, resulting in a perceived lack of recognition and imbalance in local control. With respect to wildlife trades, villages surrounding the Reserve have lost out the most, whilst relatively few government or donor-driven initiatives have assisted with alternative income-generating activities. It is therefore recommended that natural resource management training at the very least is provided to more villagers surrounding Amani Nature Reserve since yet very few are employed yet have the potential to become more involved in decision-making processes.

Business acumen

Another factor contributing towards susceptibility to regulatory and market changes is the generally low business acumen. In addition to poor knowledge regarding international trade regulations and markets, communities in the East Usambara Mountains have little or no micro-business management skills. Currently, there is no access to loans and little available financial capital since profits are generally used rather than converted to financial savings. Profits were put towards a mixture of long-term assets (e.g. housing material, livestock and land) and short-term (e.g. alcohol and entertainment) uses. However, even the longer-term assets are rarely converted back to financial capital, which are needed in times of hardship.

The facilitation of micro-business set-up, financial savings, micro-finance and business management training (particularly for alternative income-generating activities around protected areas) would greatly enhance livelihood prospects and reduce communities' susceptibility to change in the East Usambara Mountains. Restrictions should always be supplemented with sufficient alternatives.

One strong potential with regard to increasing local business opportunities and control in respect to wildlife trade is ‘captive production’ (here defined to include captive breeding, ranching and farming operations) of live animals. Tanzania already has a number of approved CITES 'farmed' (F1) and captive-bred (C) quotas for reptiles. The 2000 live export quota of F1/C reptiles included 26 out of total 84 species and 7,372 out of 160,562 specimens. At present, all F1/C reptiles are produced from exporters' facilities. In recent times, members of the Tanzanian government have expressed concerns regarding the future of captive production. Whilst it is seen to reduce pressure on wild populations, there are concerns that captive production may reduce incentives for conservation of wild populations and secondly, that benefits accrued are retained by relatively few people compared to wild collection. An ideal solution, perhaps offered by the unique situation in the East Usambara Mountains, is to initiate an experimental joint-management captive production programme involving both local communities and staff from the Amani Nature Reserve and East Usambara Conservation Area Management Project. Such a partnership would ensure greater involvement, control and benefit sharing at the local level whilst ensuring district and national involvement. Similar programmes exist in other areas of Africa, the nearest being Arabuko Sokoke Forest butterfly farming project in Kenya (Ashley 1999).

A joint-management captive breeding project could also provide the opportunity for attempting to implement non-detriment findings and establish quotas at the local level. Presently, all live export quotas are determined at the national level (recognizing species biogeographics) although a local project holds the potential for local communities to have a greater say in national quotas, especially for quota species with restricted ranges but occurring in the East Usambara Mountains (e.g. chameleons Bradypodion fischeri and Chamaeleo deremensis). It is also worth noting that this kind of project has the potential to create added-value products, thereby increasing monetary returns. Animals produced and certified as sustainably produced with community benefits would be valuable and attractive to international markets and justifiably sold at higher prices.

REFERENCES

Anon. 1963. Growth rates of East African Camphor – Ocotea usambarensis. Tanzania Tech. Note (Silvic.) No.55 (Sungwi, West Usambaras. Barankata, Kilema, Kifura, West Bombari).

Ashley, C. 1999. Financial and Livelihood Impacts of Butterfly Farming at Arabuko Sokoke Forest. African Wildlife Foundation, Nairobi, Kenya.

Bingelli, P. 1989. The Ecology of Maesopsis Invasion and Dynamics of the Evergreen forest of the East Usambaras, and their Implications for Forest Conservation and Forestry Practices. In: (Ed: Hamilton, A.C. and Bensted-Smith, R.) Forest Conservation in the East Usambara Mountains Tanzania. IUCN Tropical Forest Programme, Gland.

Desissa, D. and Hamisy, W.C. 1999. Survey of medicinal plans in Mbomole and Mlessa villages around Amani, East Usambara, Tanzania. National Herbarium, Addis Ababa University, Ethiopia and Silvicultural Research Centre, Lushoto, Tanzania.

Fleuret, A. 1980. Non-food uses of plants in Usambara. Economic Botany. 34(4): 320-333.

Hall, J.B. 1995. Maesopsis eminii and its status in the East Usambara Mountains. East Usambara Catchment Forest Project Technical Paper 13. Forest and Beekeeping Division and Finish Forest and Park Service, Dar es Salaam and Vantaa. Iii + 40 pp.

Hamilton, A.C. and Bensted-Smith, R. 1989. Forest Conservation in the East Usambara Mountains Tanzania. IUCN Tropical Forest Programme.

Hamilton, A.C. and Macfaryen, A. 1989. Climatic Change on the East Usambaras. In: Forest Conservation in the East Usambara Mountains Tanzania. (Ed: Hamilton, A.C. and Bensted-Smith, R.). IUCN Tropical Forest Programme.

Härkönen, M. and Vainio-Mattila, K. 1998. Some Examples of Natural Products in the Eastern Arc Mountains. Journal of East African Natural History 87: 265-278.

Johansson, S.G., Katigula, M.I.L., Mashauri, S. and Mndolwa, A. 1997. Biodiversity conservation in the East Usambaras: Experiences from the East Usambara Catchment Forest Project, Tanzania. Paper prepared for the conference on African rainforests and the conservation of biodiversity, 17-24th January 1997, Limbe, Cameroon.

Kajembe, G.C. and Mwaseba, D. 1994. The extension and communication programme for the East Usambara Catchment Forest Project: East Usambara Catchment Forest Project Technical paper 11. Forest and Beekeeping Division and Finnish Forests and Park Service, Dar es Salaam and Vantaa.

Kessy, J.F. 1998. Conservation and utilization of natural resources in the East Usambara Forest Reserves: Conventional views and local perspectives. WAU dissertation no. 2396. http:\\www.agralin.nl/wda/abstracts/ab2396.html

Kingdon, J. 1990. Island Africa. Collins, London.

Lovett, J.C. 1989. The Botanical Importance of the East Usambara Forests in Relation to Other Forests in Tanzania. In: Forest Conservation in the East Usambara Mountains Tanzania. (Ed: Hamilton, A.C. and Bensted-Smith, R.). IUCN Tropical Forest Programme.

Lovett, J.C. and Wasser, S.K. (eds.). 1993. Biogeography and ecology of the rain forests of Eastern Africa. Cambridge University Press, Cambridge.

Luukkanen, O. 2001. Management of biodiversity in the East Usambaras, Tanzania. University of Helsinki. www.utu.fi/ml/biodiv/1stphase/html/8en.htm

Milledge, S.A.H. In progress. Live Wildlife Exports from Tanzania. TRAFFIC East/Southern Africa.

Myers, N. 1988. Threatened biotas: “hot spots” in tropical forests. Environmentalist 8: 1-20.

Myers, N., Mittermeier, R.A., Mittermeier, C.G. da Fonseca, G.A.B and Kent, J. 2000. Biodiversity hotspots for conservation priorities. Nature 403: 853-858.

Newmark, W.D. 1998. Forest Area, Fragmentation, and Loss in the Eastern Arc Mountains: Implications for the Conservation of Biological Diversity. Journal of East African Natural History 87: 1-8.

Rodgers, W.A. and Homewood, K.M. 1982. Species richness and endemism in the Usambara mountains forests, Tanzania. Biol. J. of the Linnaean Soc. 18: 197-242.

Roe, D., Milledge, S., Mremi, J. and Mosha, S. In progress. Using participatory techniques to obtain local perspectives on wildlife trade in Tanzania. *Submitted to Oryx*

Ruffo, C.K. 1989. Some Useful Plants of the East Usambaras. In: Forest Conservation in the East Usambara Mountains Tanzania. (Ed: Hamilton, A.C. and Bensted-Smith, R.). IUCN Tropical Forest Programme.

Schmidt, P.R. 1989. Early Exploitation and Settlement in the Usambara Mountains. In: Forest Conservation in the East Usambara Mountains Tanzania. (Ed: Hamilton, A.C. and Bensted-Smith, R.). IUCN Tropical Forest Programme.

Tye, A. and Kimaro, N. 1992. Report on pitsawing activities in Amani Division. Unpublished report, 7 April 1992. 30 pp.

WWF and IUCN. 1994. Centres of plant diversity. A guide and strategy for their conservation. 3 volumes. IUCN, Cambridge.