Chapter III
Driving Forces

Zambian lioness, Luangwa valley (Photo : B. Chardonnet).

"*A l'instant où King allait saisir le cou du* morane *entre ses crocs, une balle l'atteignit là où il le fallait, au défaut de l'épaule, droit au cœur. Il fut soulevé, rejeté par le choc et rugit de surprise plus encore que de colère… Et tout à coup ce fut le silence. Et tout à coup, à l'ombre des longues branches chargées d'épines, il y eut, couronnées de crinières, deux formes inertes : le corps d'un homme et le corps d'un lion.*"

Joseph Kessel, 1958. Le Lion.

1. COHABITATION OF MAN AND LION

1.1. LION HABITAT UNDER HUMAN PRESSURE

Human causes appear to be the prevailing factors responsible for the shrinkage of lion habitat. However non-human causes have impacted lion habitat, such as desertification and subsequent decline of lion prey availability. For instance, the desertification phenomena has certainly contributed to the withdrawal of lions from areas of the high Northern latitudes, such as the Adrar des Ifhoras in Mali, the Aïr Ténéré in Niger or the Ennedi in Chad.

The most important long-term threat to the presence of lion in any part of Sub-Saharan Africa lies with human settlements and particularly agriculture and livestock rearing in lion habitat. The distribution maps of lion subpopulations tend to confirm the direct inverse correlation of (i) lion density and numbers with (ii) human activity and presence.

The reduction of habitat might be considered as an indirect, although most powerful, effect threatening the lion taxon. Direct effects also originate from the presence of man as super-predator within lion habitat. If wildlife prey habitats are converted to agriculture or grazing for domestic livestock, human/lion conflicts are bound to increase. Unless conflicts are alleviated (compensation to local people for losses incurred, removal of problem animals, etc), locals will shoot, trap or poison them, leading to fewer lions in that area.

A common consequence of the human occupation of lion habitat is the development of negative perceptions of lion presence in the mind of local communities. A demonstrative example is the case study in Queen Elizabeth National Park, Uganda, where questioned local communities openly expressed their negative attitude towards lions (Dricuru, 2000), to the point that "*…in Queen Elizabeth NP…we are more concerned about the poisoning of wild carnivores and scavengers (lions, hyenas, vultures, etc)…this is extremely destructive - ecologically and economically*" (Siefert, 2000).

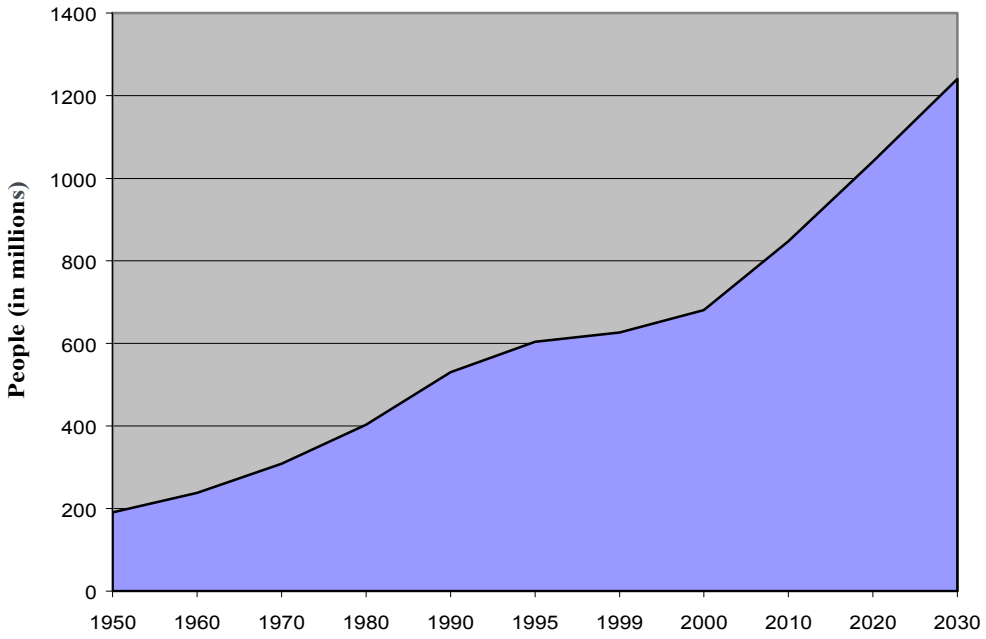
Man appears to be the main cause of the modification of lion habitat through a number of factors.

- **Human demographic growth**

In 1950, the human population of Sub-Saharan Africa (SSA) represented only 7.6% of the global population, but 11.3% in 2000, and it is expected to represent 15.3% in 2030 with more than 1.2 Billion people (Figure 3).

Furthermore, urbanisation is developing in SSA: between 1950 and 2000, urban populations of SSA were multiplied by 9.2, and will be again multiplied by 2.7 by 2030. During the same period, rural populations will however also increase. They have been and will be multiplied "only" by 2.7 and 1.3 respectively (FAO, 2000-2001 *in* Tacher *et al*, 2001).

FIG. 3 – HUMAN POPULATION GROWTH IN SUB-SAHARAN AFRICA (Source: FAO, 2001; *in* Tacher *et al*, 2001)



- **Agricultural and livestock encroachment**

With a land area of about 30 million km², Africa is the largest continent on earth and SSA represents about three quarters of it. This vast block of land is progressively being transformed by various human uses.

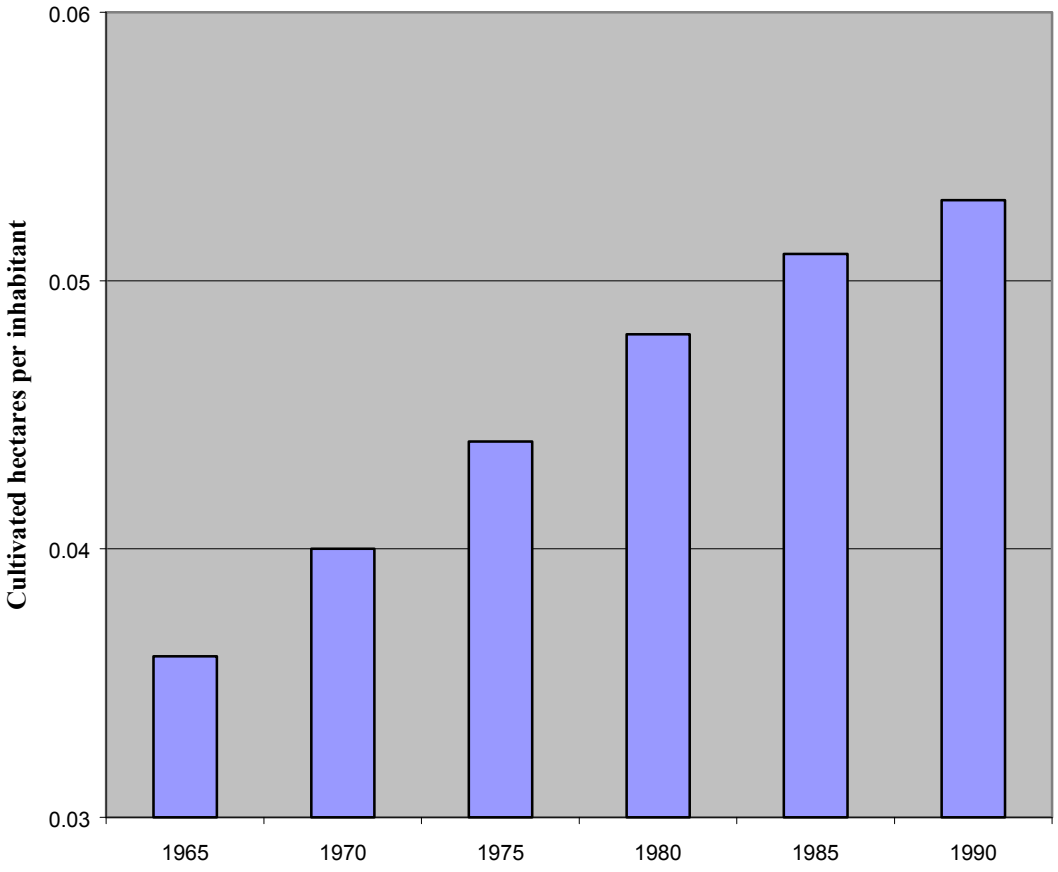
- **Cultivated lands**

For the whole planet, cultivated lands have been multiplied by 1.64 in the last 36 years. However, pressure on land has differed greatly between developed and developing countries. The total area of cultivated lands increased by 80% in developing countries while it has remained virtually the same in developed countries and actually decreased in Europe. In SSA it has been multiplied by 1.64, corresponding to the global average (Figure 4).

- **Pastoral rangeland**

The total area of pastoral rangeland remains stable in most parts of the world. During the last 25 years, however, the size of grazing area per inhabitant has decreased everywhere due to human demography, but it has decreased more rapidly in SSA. Nevertheless, SSA still has the most hectares of pastoral rangeland per inhabitant (1.8 ha/inhabitant in 1990).

FIG. 4 – RISE IN CULTIVATED LAND IN SUB-SAHARAN AFRICA (Source: Tacher *et al*, 2001)



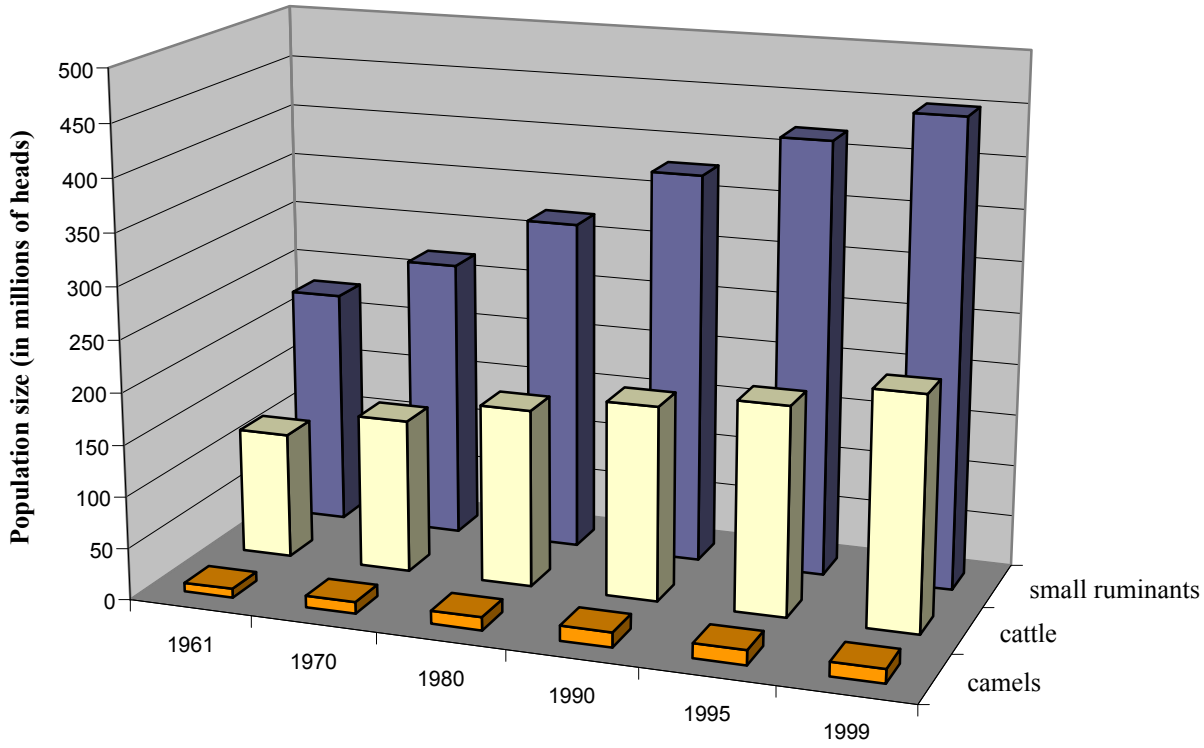
- **Livestock development**

Numbers of domestic livestock have increased in developing countries such as SSA (Figure 5) while they have decreased in developed countries. Furthermore, it looks like this trend is ongoing.

After Latin America, it is in SSA that the greatest numbers of cattle per inhabitant are found.

SSA has the greatest numbers of small ruminants (sheep, goats and camels) of all the developing countries (in particular, twice as many goats as the average seen in other developing countries). Today there are probably nearly 450 Million head of small ruminants in SSA and close to 200 Million head of cattle.

FIG. 5 – INCREASE IN NUMBERS OF DOMESTIC ANIMALS IN AFRICA (Source: FAO, 2001; *in* Tacher *et al*, 2001)



- **Pressure on lion prey habitat**

Change in lion prey availability can be a direct consequence of human development as exposed in the preceding paragraphs.

The availability of prey species, not surprisingly, has a direct effect upon the population density of lions (Schaller, 1972; Dunham, 1998; Dublin & Ogutu, 1998; many others). Low prey densities result in low lion densities.

In Northern CAR, for instance, the recent decline of lion populations may be partly due to the decrease of kob (Buffon's kob, bohor reedbuck, defassa waterbuck) populations submitted to severe poaching pressure (J. Tello, pers. comm.), even though another cause is the systematic shooting of lions by nomadic cattle herders entering Protected Areas during the dry season (B. Chardonnet, pers. comm.).

An adult female lion needs a minimum of 5kg of meat per day to maintain basic metabolic requirements (Schaller, 1972). Lions also need more room than any other predator. Their behaviour, predatory and reproductive strategies etc. show extensive regional variation. They are highly adaptable. Fundamental ecological and behavioural characteristics of carnivores such as density, grouping, pattern, range size and prey selection are influenced respectively

and individually by habitat and prey density, dispersion and richness (Stander, 1997). When wild prey availability is reduced, for instance because of drought or disappearance of wild habitat due to expanding human settlements and activities, lions, more so than in the case of other large predators, feel disposed to prey on domestic herds. This is particularly tempting when, as explained previously, they can easily access the farmlands just outside the conservation areas. Rudnai (1983) reports that a decreased availability of game in Nairobi National Park, Kenya, in 1974-75, due to a year of drought, which caused a massive die-off of wild ungulates, resulted in an increase in the hunting range of the resident lion prides and thus more regular excursions of lions into the surrounding areas. During the 1980s, fatal attacks by lions in Southern Tanzania were attributed to heavy poaching of wild ungulates, so that lions, deprived of natural prey, turned to livestock and entered villages (Nowell & Jackson, 1996).

- **Domestic animal/wildlife interface**

The fragmentation of lion habitat due to human encroachment has led to a growing overlapping of lion and human ranges and to a developing interface between lion and man's activities. One of the main consequences is an increasing sanitary impact on lion populations.

- **Prey diseases**

A number of diseases affecting lion prey species (wild, domestic or both) may have a significant impact on habitat quality:

- Directly, when the disease may be transmitted straight from the prey to the lion, which is consequently infected (e.g. bovine tuberculosis/BTB), and;
- Indirectly, when the disease is not transmitted to the lion itself, but causes wildlife die-offs and reduces prey availability with obvious consequences on the population dynamics of the lion (e.g. rinderpest/RP).

RP is an interesting case study as:

- To the best of current knowledge, the disease is transmitted by domestic animals to wildlife, and;
- One can observe at least two main development phases:

  (i) In the first phase, the occurrence of a RP outbreak kills a large number of susceptible species (such as giraffe, buffalo, antelopes and warthog). Predator numbers, not just lions, increase as a result of the surplus of easily available food resulting from sick and dead animals, and;
  (ii) In a second, later, phase, the crash in prey populations leads to a reduction of the number of predators as this exceptionally abundant food supply disappears.

Similar interactions happen when a prolonged drought causes massive wildlife or livestock die-off.

- **Lion diseases**

Domestic and feral cats may act as vectors for diseases such as FCaV, FeHV, FIP and rabies, while domestic and feral dogs may carry CDV and rabies. All of which can directly

contaminate lions. Furthermore, immunosuppressive disease agents such as FIV and FPV could predispose the lions to other opportunistic illnesses.

BTB appears to be a major threat to lions in some ecosystems such as Kruger National Park (KNP) (R. Bengis, pers. comm.), South Africa, and a potential one in Queen Elizabeth National Park, Uganda (M. Woodford, pers. comm.). In KNP, BTB is taking a heavy toll on lions. Sick animals are in bad physical condition, are attacked by other members of the pride, and disappear rapidly. In the Southern part of KNP, where BTB is supposed to have been introduced several decades ago (de Vos *et al.,* 2001) by domestic cattle grazing along the Crocodile river, out of 31 lions tested, all were found positive to a tuberculin skin-test, except for two cubs of approximately 5 months of age. The disease has been slowly spreading northwards in the Park, buffalo apparently acting as host, but affecting also greater kudu, cheetah and leopard (Bengis & Keet, 2001). If BTB becomes endemic in KNP, it could mean the end of its lion population, putting a stop to all export/sale of live animals to other wildlife reserves, and a stop to the opening of KNP's fence on the Mozambique and Zimbabwe borders, in order to protect these countries' cattle industry and people (Winterbach, 1998).

Lion populations affected by an epizootic disease, however, have shown remarkable resilience and potential for quick recovery, as demonstrated by the Serengeti ecosystem in Tanzania: the CDV, transmited by dogs, was considered responsible for a 33% die-off of lions in the Serengeti-Masai Mara ecosystem (Hofmann-Lehmann *et al.,* 1996), where the lion population is recovering dramatically after having been reduced by one third (Kelly, 2001).

1.2. LION VERSUS PEOPLE CONFLICTS

The African lions, as most large carnivores, require vast areas in which to roam. This tends to bring lions into direct competition with people whose need for land is increasing exponentially as human populations expand. Consequently, interactions between humans and these large predators in Africa are increasing and human-lion conflicts are intensifying accordingly. Human expansion and subsequent harassment by people have led to lions being increasingly confined to conservation areas and it is on the perimeter of these that most conflicts occur (Mills, 2000).

The interface between people and large predators in rural Africa most often consists of predation on livestock, but also of human injuries and death. This problem is particularly acute in the semi-arid rangelands of Africa where pastoralists compete with large wild herbivores and in contact with lions. Lions are dangerous predators whose existence is mostly at odds with human activities. In the mind of most rural communities in Africa, lions are considered as pests and should be eliminated. This hostility toward lion conservation is further exacerbated when local measures to prevent human-predator conflicts and to compensate the losses in livestock or human lives are absent or judged inappropriate by the affected communities. This leads to further persecution of lions by people. Different types of management measures for conflict mitigation are currently being devised and experimented in Africa. However, the apparent mutual exclusivity of lion cohabitation with people remains one of the main threats to lion conservation outside Protected Areas (Jackson, 1997).

- **Predation on livestock**

In the regions of Africa where lions occur, lion predation on livestock is reported as the main form of conflict between the predators and local people. The problem is particularly acute in semi-arid rangelands of the Sahel and Eastern and Southern Africa where human expansion and recent changes in land use practices have increased the competition between pastoralists, newly settled farmers owning livestock, and lions, especially around Protected Areas.

The following reports illustrate the extent of the problem and show that lion raiding incidents on livestock are not rare in Africa:

- In Cameroon, the lion population of Waza National Park is reported to cause serious damage to livestock, estimated annually at 700 cattle and over 1,000 small ruminants (sheep and goats). This amounts to an economic loss of around US$140,000 per year (Bauer & De Iongh, 2001).

- In Kenya, data on damage to livestock were collected for the years 1970-75 from the Kitengela Conservation Unit, an area adjoining the Southern boundary of Nairobi National Park. Fifty-eight head of livestock were killed during the study in the area (Rudnai, 1983). In Galana Ranch, over an approximately 20-year period (approx 1968-1988), lion killed about 1% of livestock per year, i.e. 250-300 head of cattle (A. Radcliffe, pers. comm.).

- In Uganda, in the vicinity of Northern Queen Elizabeth National Park, losses caused by lion predation on livestock between 1990 and 2000 are estimated at US$6,400 (Bauer & De Iongh, 2001).

- In Namibia, most of the lion population occurs in the North and North-East of the country where they are found mainly in Etosha National Park (ENP) and, to a lesser extent, in Kaudom Game Reserve, Nyae Nyae Conservancy and Western and Eastern Caprivi (Stander, 2000). With the intensive livestock farming that has developed around the borders of conservation areas, lion predation on livestock in these regions is a serious issue. Along the borders of ENP and in adjacent areas, 46 cattle, 13 goats, 8 donkeys and 3 horses were killed by lions between 1984 and 1988 (Stander, 1990). A study undertaken in the Kwando Region in East Caprivi evaluated the cost of stock raiding by lion in the area: between 1991 and 1993, the total economic value of stock losses amounted to US$9,073 (O'Connell-Rodwell *et al*., 2000). According to the same study, lions are considered as the animals inflicting the greatest financial losses to farmers, even more than crop raiding elephants.

- In Zimbabwe, a single example is given here for the sole District of Nyaminyami. During the past 3 years (1999, 2000 and 2001), a total of 32 incidents have been reported to the District wildlife officer with observed losses of 50 goats, 13 donkeys and 1 dog; 3 lions were destroyed by PAC operations during the period, with averages of 1 lion destroyed per year and 10 incidents per lion destroyed (Chamoko Snodia, pers. comm.). It must be emphasized that more incidents happen which are not registered.

The socio-economic impact of these losses is sometimes severe, but is especially hard to bear for impoverished communities with meagre income such as the Namibian Bushmen community. In the extreme North-East of Namibia, the Tsumkwe District, adjoining the

Kaudom Game Reserve, is the traditional land of the Ju/Hoan San. The Bushmen community, traditionally hunter/gatherers, resorted to small cattle farming in the early 1980s, but farming activities were low (Stander, 1997). From 1993, pastoralism intensified in the area, in the form of large-scale settlements, and the number of conflicts with lions increased dramatically (Stander, 1997). Stander (1997) reports that between January 1992 and December 1993, livestock were killed on 17 occasions. Twenty head of cattle and 5 horses (12.2% of total) were killed. 40% of the total number of villages of the Tsumkwe District suffered from livestock losses with an average annual loss by lion predation of US$18.75 for each affected village. This represents a severe drawback for subsistence farmers.

To conclude, the impact of lion predation on domestic animals is highly variable depending on the scale of the livestock operation. As mentioned above, it can be particularly devastating for small traditional farmers who depend on few livestock to sustain their living. It is thus a significant problem on a local level.

To fully grasp the growing importance of the livestock-lion conflict issue in some parts of rural SSA today, it is appropriate to review here some of the driving factors that have led to the current conflictive co-existence. These include in particular:

- **The vicinity and expansion of human settlement and activities**

In SSA, pastoralists and their livestock have co-existed with wildlife for some 7,000 years or more and it is likely that few of the tensions evident today were present in the past (Bourn & Blench, 1999). However, co-existence has become more difficult in recent times due to a combination of reasons and circumstances.

Over much of Africa, the general trend in the 20th century has been for livestock and wildlife to be managed separately. National Parks were set aside and livestock and people are excluded from the great majority of such areas in Africa today. Outside those Protected Areas, wildlife is extensively hunted and high pressure is exerted on predators as they impede human development. In the last few decades, demographic pressure in some parts of Africa has led to rural people moving progressively into wild lands that were former lion habitat. Pastoralists are gaining access to protected rangeland and villagers are farming up to park boundaries (Bourn & Blench, 1999) containing large carnivores, thereby accelerating the potential for lion attacks on livestock and sometimes people.

The periphery of conservation areas are therefore particularly exposed. This is where most of the reported clashes with lions occur. The immediate vicinity of human settlements and farmland with Protected Areas is often the direct cause of their occurrence. In some cases, local communities, living traditionally within the boundaries of the newly created park, were displaced right outside its borders. In this context, it is easy to understand that these communities object to lions coming from the park to kill their livestock and sometimes people. In addition, because of their resentment against the park system, these communities will not hesitate to intrude into the adjacent park to let their domestic animals graze. In Waza National Park, Cameroon, presence of cattle inside the park is increasing and people do not hide the fact that many of the lion predation incidents on domestic animals occur inside the park boundaries (Bauer *et al.*, 2001). This of course multiplies the possibilities of lethal encounters between lions and people and their livestock. Worse, according to Bauer *et al.* (2001), the increasing predation on cattle by lions both outside and inside the park could transform the entire lion population of the area into stock killers.

Movements of livestock and wildlife across protected areas boundaries are common in SSA as most of the areas having the largest lion populations are not fenced. In some regions, however, fences have been erected to prevent interaction of wild animals from the parks with people and livestock who live outside their boundaries, but fences are costly to maintain and are often damaged by erosion or animals like warthog. Lions can therefore move easily out of the parks to neighbouring farmlands. In other cases, surrounding communities deliberately destroy fences. In South Africa, on the border of Kruger National Park, the people of the adjacent village of Makoko were found eating roasted meat of four lions. The villagers claimed that lions coming from the park had killed eight of their cattle. According to the *South Africa's Sunday Time* of 23^{d} March 1997, which relates the incident, the villagers had taken 500 metres of the park fence for housing and crop protection (Cat News, 1997).

Another aspect of lion behaviour, which can further exacerbate human hostility toward lions and cause conflicts, is what is called "surplus killing". Similarly to some other large felids, a lion breaking into a fenced enclosure will sometimes kill many more domestic animals than it can eat (Nowell & Jackson, 1996). Nowell & Jackson (1996) refer to Guggisberg (1961) who reports that six lions killed 51 ostriches kept in an enclosure but only a small part of these animals were actually eaten.

- **Preying on humans**

The African lion also occasionally preys on people. Experts have noted that some individual animals can, in certain circumstances, develop abnormally aggressive behaviour. After several dangerous personal encounters with lions, the senior South African researcher, Ian Whyte, considers that old, sick or injured lions, or animals that have been pushed out of a pride were the animals that usually became man-eaters. "*It is generally accepted that lions avoid man because they have a great respect for him. This fear disappears however, after a lion has killed a human for the first time. Lions that are held in captivity and relocated in the wild are among the most dangerous animals in the world, purely because they have lost their fear of humans*" (CAT News, 1997).

Fatal lion attacks on local people inside or outside the perimeter of conservation areas have often been reported, however they are not always publicised. These incidents usually take place in or around areas with high lion density, such as the Kruger National Park (KNP) in South Africa or the Selous Game Reserve (SGR) in Tanzania:

- Between December 1996 and August 1997 in South Africa, at least 11 (possibly more) illegal immigrants making their way from Mozambique across the KNP on foot were killed by lions (Cat News, 1997). In March 2002, the *Star* of 4th March 2002 reports that another Mozambican immigrant was killed by a lion and the predator then dragged his body through the neighbouring town of Phalaborwa (Wildnet Africa, 2002).

- Between 1995 and 2000, some villages in Tanzania have suffered dramatic attacks by lions on people. The level of conflicts around the SGR is regarded as high with 15-30 people killed each year (V. Booth, comm. pers.). One single village, on the edge of the Selous Reserve, has had between 29 to 50 people killed a year during this period (E. Pasanisi *in* Strang, 2002). In 1999 alone, a total of 21 people were killed by lions in Southern Tanzania (J.J. Jackson, pers. comm.). However, not all the reported conflicts occur along the borders of Protected Areas. In South-eastern Tanzania human population

densities are low. Precisely because of this low human density, lion populations are widespread outside Protected Areas and the level of incidence of man-eaters in the region is high (V. Booth, pers. comm.).

- Similarly, the Luangwa Valley in the Eastern part of Zambia provides good lion habitat but it is also an area of human settlement, such as villages and cultivated areas. This situation increases the chances of conflicting encounters between lions and local people. Three fatal lion attacks on people were reported in August 1991 in the Luangwa Valley (Yamazaki & Bwalya, 1998).

- During the 1923 rainy season, 21 people were killed by a pair of lions near Po, Burkina Faso (Raynaud & Georgy, 1969).

- **Preventing or resolving conflicts**

It is apparent that locally lion predation is a significant problem in Africa, especially for rural communities with meagre resources. Domestic animals often represent the only wealth that a community has in rural Africa: (i) their milk and meat consitute a vital food component for their survival, (ii) the herd is a saving mechanism and a source of cash, (iii) the social role of livestock is of major importance in pastoralist cultures. The loss of this important resource to marauding lions represents a real hardship and understandably creates hostility towards lions and increased apathy and antagonism towards wildlife conservation *per se*. One can see here a relation between poverty alleviation and wildlife conservation success.

A common problem associated with many Parks and Reserves in Africa is the issue of cost and benefit. Local communities bear the costs of the protected area through the loss of stock due to lion predation and the opportunity costs as a result of loss of grazing and arable land. Few if any of the benefits from photographic or sport hunting tourism ever filter down to these communities. As a consequence, wildlife is illegally hunted and the Park is fraudulently used as pasture for cattle or as human settlement. More generally, with no tangible benefits to these communities, wildlife-human conflicts are intensifying and are threatening the survival of large predators inside and outside National Parks (Lichtenfeld, 2001).

Even in countries with small lion populations, the incentive to conserve the few lions left is low. For instance, Abdoulaye Kane (pers. comm.), the IUCN Country Representative in Senegal, mentioned "*a high pressure exerted by the local populations on authorities to allow and organise a lion killing campaign because of loss of domestic animals due to the lions*".

Many rural Africans have little or no sympathy for the predators. Additionally, responses from the conservation authorities to address the issues are absent or not always appropriate and compensation schemes to alleviate stock losses are often not functioning. A study carried out in 1974-75 in the areas bordering the Southern part of Nairobi National Park in Kenya showed that the Masai pastoralists who traditionally tolerated wildlife were less and less willing to suffer losses by predation without compensation. As Rudnai (1983) explains, "*while these losses may be low in statistical terms, resentment engendered by even a few kills may be out of proportion with real damage suffered, since the individuals feel they do not benefit from game in general and predators in particular, yet have to bear the brunt of the damage inflicted by wild animals. Even though compensation payment for livestock killed by lions is on the books, in practice it is virtually unavailable because of a cumbersome administration*".

Conservation strategies have recently been introduced in some African regions to alleviate lion-people conflicts by encouraging local participation in conservation. In Laikipia Plateau in Kenya, an innovative conservation project (L. Frank & R. Woodroffe) intends to reconcile local communities with predators and lions in particular. At the basis of the scheme is the development of cooperative ventures between commercial ranchers and local communities where the latter receive some of the benefits derived from commercial tourism operations. Ranchers and local communities are slowly realizing that there is more money to be made in keeping wildlife alive (Martin, 2001).

Similar schemes are being implemented successfully in Tanzania where sport hunting makes a positive contribution to the local economy. Under the new laws (Wildlife Policy of Tanzania, 1998 and the forthcoming Wildlife Management Area Regulations, 2001), benefits from trophy hunting and ecotourism go directly to local communities. Under this legislation, the communities can draw up contracts with hunting companies and lodges. In pilot projects this has proven a major incentive for villagers to conserve and protect game on their village land (V. Booth, pers. comm.). The Selous Game Ranch generated US$1.28 million in 1992 and lion generated 12%-13% of this income (Creel & Creel, 1997).

Similarly, in Namibia, a system for allowing conditional rights over wildlife and returning benefits to rural communities has been established. Through this policy, organised tourism enterprises directed at viewing or hunting lions with benefits going to pastoralists should be implemented: "*Revenue gained through lion-tourism is expected to exceed lion-related livestock losses, which will turn the large carnivores into a benefit for the communities in the Kunene region*" (Stander & Hanssen, 2001). These schemes, currently in place for the Kunene and Kaudom sub-populations (P. Stander, pers. comm.), are being designed as part of a long-term strategy to alleviate economic losses from lion predation and reduce indiscriminate persecution of lions by farmers outside Protected Areas.

Ultimately, the survival of wildlife and lion in particular depends on their acceptance by the people who must share their habitat. However, when the cost of cohabitation is high and compensation is low, there is little or no incentive for conservation. As Stander (1997) explains, "*the future of large carnivores outside conservation areas in Africa depends on the views and aspirations of the local people. Only when the local inhabitants…have a particular interest in conserving large carnivores will their future be ensured*".

- **Long-term threat to lion conservation**

While human/lion conflicts may have little effect upon high-density lion populations, the impact on smaller or fragmented lion populations that are vulnerable can be significant with additional factors such as low density or the aridity of habitats with low prey density exacerbating the effects. Stander (1997) considers that due to the intensity of pastoralism in the vicinity of Kaudom Game Reserve in Namibia, on the border with Botswana, by the end of 1995, almost all of the 27 lions present in the area had been killed: "*considering some basic ecological characteristics, such as a) low lion density, b) large home ranges, c) the relatively small size of the Reserve, and d) intensity of pastoralism on the borders, the conflicts are expected to have a catastrophic effect on this lion population*".

The prevention and resolution of human/lion conflicts is a complex problem and requires a holistic approach. Solving this problem is not the purpose of the present study and therefore only some of the main issues are outlined here.

- **Problem lion control**

The first direct response to lion-human conflict is the destruction of the offending lions by farmers and other affected local people. Lions are shot, trapped or poisoned to prevent further damaging incursions of the predators on their lands. A frequently used method of killing lions that have been raiding livestock is through the use of poisons either agricultural or natural. Farmers, particularly pastoralists in some areas have used this to great effect, even eradicating lions in some areas, as well as indiscriminately affecting other carnivores including birds. Given the availability of chemical pesticides in rural Africa today this is a serious threat to many populations. In most of SSA, it is legal to kill lions when they attack domestic animals or people. Official Problem Animal Control (PAC, *battues administratives*) is the responsibility of the wildlife authorities.

In the Pan region in Botswana, an average of seven lions are killed per year through PAC, which amounted to 14% per annum of the sub-population in 1999-2000. An average of 25 lions per year are killed in the Okavango Delta through PAC, which is less than 2% of the sub-population (V. Booth, pers. comm.). In Botswana, in August 2000, the Department of Wildlife and National Parks (DWNP) prohibited lion control and set a zero quota for trophy hunting for one year. According to Sarel van der Merwe (pers. comm.), chairman of the African Lion Working Group of the IUCN/SSC, reports from the Makgadikgadi Pan National Park already indicate that, as a result of clashes between lions and livestock owners, lions are now being illegally poisoned, snared and shot without these incidents being reported to the DWNP.

According to P. Funston (pers. comm.), in the areas bordering the Kgalagadi Transfrontier Park, angry South African and Botswana farmers eliminated 93 lions over a period of 4 years up to 2001, in response to losses due to lion predation. Although the Kalahari lion population would easily sustain the off-take (Funston, 2001), it does demonstrate the nature and size of the problem.

In Namibia, around Etosha N.P. alone, more than 30 lions are killed every year through PAC activities (Stander, 2000). This is confirmed by the Namibian Government biologist, Hu Berry (1996), who reports that during the period 1965-94, more than 1,000 lions were destroyed on farmlands bordering Etosha (Etosha Ecological Institute records). He further indicates that the number of animals killed may have been higher because before 1995, farmers were not legally bound to report the killing of lions to the administration. In the Caprivi, an average of 7.2 lions have been shot each year, for the last 5 years (P. Stander, pers. comm.).

In Galana Ranch in Kenya, between 1968 and 1988, persistent stock raiding lions were shot, and roughly 1 lion was shot for every 10 cattle killed. Approximately 25 lions per year were shot out of a stable population of 150. In the period 1988-1990 the Government prohibited the use of firearms, and numbers of livestock killed rose to roughly 250 to 800 per year; with approximately 70% of the stock raiding lions being young males. Around 1990, the ranch was handed over to ADC, a parastatal company, who now uses poison to control stock raiding lions (A. Radcliffe, pers. comm.).

Several non-lethal management options are also currently being tested and implemented. When it is deemed unnecessary to kill stock-raiding lions, they are either lured back into their normal range or translocated away from the area. The process involves capturing a specific, problem-causing lion alive in the area of conflict, transporting it to another area and releasing it (Linnell *et al.*, 1997). Translocation has been experimented with mixed results in Namibia (Stander, 1990). Extensive research on translocations of problem lions showed that this does not solve problems nor reduce the conflicts (Stander, 1990). When conflict persists, lions are generally destroyed (V. Booth, pers. comm.).

- **Improving management strategies**

Other methods employed besides removing the offending animals, consist of simply excluding lions through management practices. Erecting electric fences between conservation areas and densely populated human zones or farmlands can be an effective way to keep the lions away from humans (Yamazaki & Bwalya, 1999). On their side, cattle raisers have a responsibility to implement sound stock management practices to protect their animals from lion predation. Simple measures such as erecting lion-proof shelters for livestock at night can make a big difference (Mills, 2000). Changes in modern society also affect traditional husbandry methods, for instance, in rural Namibia, young boys used to protect herds at night. However, with the independence of Namibia in 1991 and increased access to schools, herds are now left unattended at night and they wander into predator areas (O'Connel-Rodwell *et al.*, 2000).

- **Financial compensation**

Financial compensation for losses resulting from lion predation can be the final step and a way to encourage local people to tolerate lions' presence. Compensation can be an effective tool when it is not abused (Nowell & Jackson, 1996). However, while it may be feasible to assess the level of livestock losses, the exercise relates to values which can only be accounted for with great difficulty in the case of loss of human life. Generally speaking, lethal and non-lethal control options for lion conflict resolution are costly. The system of compensation requires that the central wildlife authorities have the appropriate financial resources and the capacity to implement the scheme. This can be a major impediment for conflict resolution in African countries where budgets for conservation are low.

However, compensation is essentially a negative payment. It does little to remove the over-riding conflict of interest between local peoples' development aspirations and the conservation of lions. Ultimately, measures consisting of creating or increasing the value of lions to local people through ecotourism and hunting operations while ensuring that the benefits from such operations accrue to local communities might be a suitable option to alleviate conflicts and to improve people's perception of the predators, thus creating the local incentive to conserve lion populations.

2. LION AS A RESOURCE

Game viewing is often presented as "non-consumptive" use whereas other forms of use such as tourist hunting or live sales are presented as "consumptive" use. This distinction is certainly Manichaean and even possibly invalid as has been pointed out by the Southern Africa Sustainable Use Specialist Group of IUCN/SSC (SA/SUSG, undated): "*many uses which are non-consumptive at the level of the individual are consumptive at the level of the ecosystem. By the same token, certain uses which are consumptive of individuals are non-consumptive at the ecosystem level. Our primary concern is that use be sustainable at the level of the ecosystem"*. However, despite its obvious ambiguity, the distinction between "non-consumptive" and "consumptive" is nonetheless used here because it is easily understandable and widely accepted.

Game viewing and tourist hunting are often presented as being exclusive one from the other. This is not always the case. There are many examples where both activities are carried out side-by-side, together with trekking, wildlife-watching and live capture. One of the best example is the outstanding Pilanesberg Reserve, South Africa, where all these activities are carried out simultaneously with great success in a small area. Even though less spectacular, many other cases exist, particularly in Southern African countries such as Botswana: *"...a combination of photographic and hunting safaris ensure the economic viability of the Wildlife Management Areas in Botswana in a way that neither can achieve on their own*" (Van der Merwe, 2001).

The income generated specifically by lions is poorly documented and publicised. Regardless of the distinction between consumptive and non-consumptive use, lions bring foreign currency through tourist wildlife viewing and consumptive tourist hunting as well as live sales. There are also non-monetary benefits due to (i) the key role lions play in the ecosystem and (ii) the spiritual value of the lion in local cultures.

TABLE 24 - STATUS OF LION USE IN WESTERN AFRICA

N° sub-population	Country	Consumptive use				Non-consumptive use	
		Hunting		Lion hunting			
		Local hunting	Tourist hunting	Local lion hunting	Tourist lion hunting	Wildlife viewing*	Lion viewing**
1	Mauritania	closed	small & medium game	closed		0	0
	Gambia	closed	small & medium game	closed		0	0
	Senegal	open	small, medium & big game	closed	open	1	0
	Guinea Bissau	open	small, medium & big game	closed	closed	0	0
	Guinea	open	small game	closed	closed	0	0
	Mali	open	small & medium game	closed	closed	0	0
	Sierra Leone			closed	closed	0	0
	Liberia			closed	closed	0	0
	Sub-total 1	**4**	**6**	**0**	**1**		
2	Cote d'Ivoire	closed	closed (due to reopen)	closed	closed	1	1
	Ghana	closed	big game limited to special licenses	closed	closed	2	0
	Sub-total 2	**0**	**1**	**0**	**0**		
3	Burkina Faso	open	small, medium & big game	open	open	2	2
	Togo	closed	limited authorization	closed	closed	0	0
	Benin	open	small, medium & big game	open	open	2	1
	Niger	closed	temporarily closed	closed	closed	2	1
	Nigeria	closed	closed	closed	closed	2	1
	Sub-total 3	**2**	**3**	**2**	**2**		
Total n° countries (out of 15)		**6**	**10**	**2**	**3**		

* *quality of current wildlife viewing (rating from 0 to 3)*

** *quality of current lion viewing (rating from 0 to 3)*

TABLE 25 - STATUS OF LION USE IN CENTRAL AFRICA

N° sub-population	Country	Consumptive use				Non-consumptive use	
		Hunting		Lion hunting			
		Local hunting	Tourist hunting	Local lion hunting	Tourist lion hunting	Wildlife viewing*	Lion viewing**
4	Nigeria	closed	closed			2	1
	Cameroon	open	small, medium & big game	closed	open	3	2
	Sub-total 4	**1**	**1**	**0**	**1**		
5	Chad	closed	small, medium & big game	closed	open	3	3
	C.A.R.	open	small, medium & big game	open	open***	3	3
	Sudan	closed	closed	closed	closed	0	0
	R.D.C.	closed	closed	closed	closed	0	0
	Sub-total 5	**1**	**2**	**1**	**2**		
6	Equatorial Guinea	closed	closed			0	0
	Gabon		closed	closed	closed	2	0
	Congo		closed	closed	closed	2	0
	Sub-total 6	**1**	**0**	**0**	**0**		
Total n° countries (out of 9)		**3**	**3**	**1**	**3**		

* *quality of current wildlife viewing (rating from 0 to 3)*
** *quality of current lion viewing (rating from 0 to 3)*
*** *quota 0 for the hunting season 2002*

TABLE 26 - STATUS OF LION USE IN EASTERN AFRICA

Country	Consumptive use				Non-consumptive use rate	
	Hunting		Lion hunting			
	Local hunting	Tourist hunting	Local lion hunting*	Tourist lion hunting	Wildlife viewing**	Lion viewing***
Sudan		closed			0	0
Uganda		open (2002)			2	1
Ethiopia	tolerated	open (2002)	closed	open	3	1-2
Kenya	closed	restricted to gamebirds only	closed		3	3
Somalia					0	0
Tanzania	open	open	closed	open	3	3
Rwanda	closed	closed			2	1
Burundi	closed	closed			0	0
Total (8 countries)	**2 open**	**3 open**		**2 open**		

* *except for problem animals*

** *quality of current wildife viewing (rating 0 to 3)*

*** *quality of current lion viewing (rating 0 to 3)*

TABLE 27 - STATUS OF LION USE IN SOUTHERN AFRICA

Country	Consumptive use				Non-consumptive use	
	Hunting		Lion hunting			
	Local hunting	Tourist hunting	Local lion hunting*	Tourist lion hunting	Wildlife viewing**	Lion viewing***
Angola		closed			0	0
Botswana	closed	open	closed	temp. closed	3	3
South Africa	open	open	closed	open	3	3
Namibia	open	open	closed	open	3	3
Zimbabwe	closed	open	closed	open	3	3
Malawi	closed	closed				
Zambia	open	open		open	3	3
Mozambique		open		open	2	1
Total (8 countries)	**3 open**	**6 open**		**5 open**		

* *except for problem animals*

** *quality of current wildife viewing (rating 0 to 3)*

*** *quality of current lion viewing (rating 0 to 3)*

2.1. LION VIEWING TOURISM

- *Western Africa*

The tourist infrastructures and trade are not well developed in this region, and wildlife-based tourism is considerably under-developed, as compared to other regions. The reasons are climatic as well as economic, in comparison with competition from Eastern and Southern Africa.

However, out of the 15 countries of the region, 7 (half) have been identified as having significant wildlife viewing, of which 5 allow some lion viewing. The two countries where one has the best chance to actually see lions in the region are (i) Burkina Faso and (ii) Benin (Table 24).

- *Central Africa*

Similarly to Western Africa, the tourist infrastructures and trade are not well developed in this region, and wildlife-based tourism is considerably under-evaluated.

However, out of the 9 countries of the region, 6 (two thirds) have been identified as offering significant wildlife viewing possibilities, of which 4 allow some lion viewing. The three countries where one has the best chance to observe lions in the region are (i) Cameroon, (ii) CAR and (iii) Chad (Table 25). It is too poorly publicised that lions are indeed quite easy to see by tourists in those last three countries, with a relatively high lion observation rate, as compared to other countries.

- *Eastern Africa*

Out of the 8 countries of the region, 5 (two thirds) have been identified as having significant wildlife viewing, all of them allowing some lion viewing. The two countries where one has the best chance to view lions in the region are (i) Kenya and (ii) Tanzania (Table 26).

In Kenya, the lion is recognised as one of the first wildlife viewing attractions (Thresher, 1981).

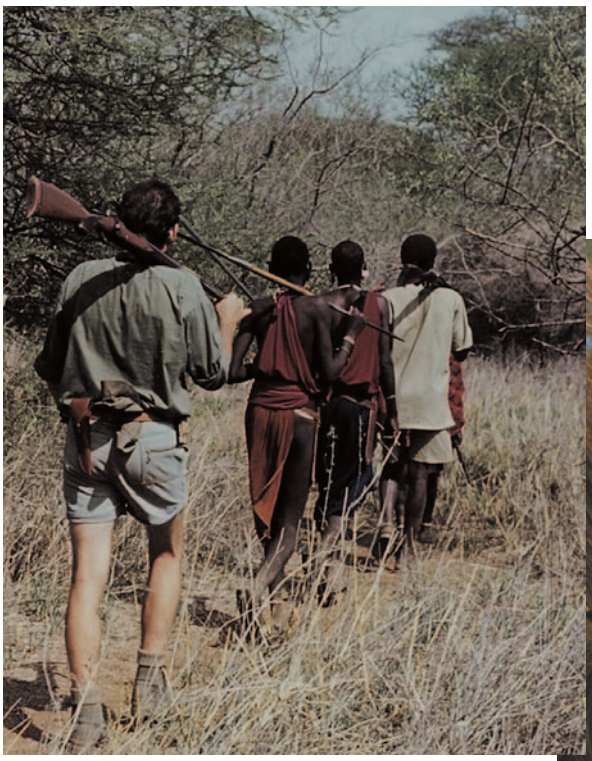
In Tanzania, lions are a major attraction in Protected Areas, particularly in the Northern tourist circuit (Serengeti, Lake Manyara and Tarangire National Parks, Ngorongoro Crater Conservation Area), but also in the Southern tourist circuit (Selous Game Reserve, Mikumi and Ruaha National Parks). The economic impact of tourism is certainly positive, but heavy non-consumptive pressure in some highly frequented areas is thought to adversely affect lions. Lion populations in Tanzania are also subject to research studies due to their easy accessibility.

- *Southern Africa*

Out of the 8 countries of the region, 6 (three quarters) have been identified as having significant wildlife viewing, all of them allowing some lion viewing. Five out of six offer a good chance to view lions (Table 27).

Lion viewing, Ngorongoro crater (Photo : S. Darroze).

South Africa Banknote (Photo : O. Buttin).



Lion hunting, Masailand (Photo : D. Roques Rogery).

Lion skull, Benin (Photo : O. Buttin).

In Botswana, there is a policy of low volume, high priced ecotourism and lions are a major draw card for tourists in the National Parks. Photographic tourism is concentrated in the areas with perennial water, i.e. the Okavango Delta and along the Linyanti/Chobe rivers. There are virtually no photographic camps in the dry areas of Northern Botswana and a limited number of camps in Central and Southern Botswana. In the Northern regions, the current ecotourism use is beneficial due to income generation. The Central regions presently have a low rate of ecotourism use that has little or no impact on lion conservation. There is a beneficial impact on lion conservation in the Southern Kalahari/Kgalagadi Region. The economic viability of community based Wildlife Management Areas in Southern Botswana (KD/1 and KD/2) depends on a sustainable lion hunting quota because of the low value of the areas for photographic tourism. No bids were received for photographic tourism in the KD/1 and KD/2 tenders until a lion hunting quota was allocated to these areas. If these areas return again to not being economically viable, the communities would no doubt want to change their pattern of land use from wildlife to livestock (P. Funston & C. Winterbach, pers. comm.).

In Malawi, active and good quality ecotourism is regarded as a positive factor in wildlife protection, but only a minute number of lions are present in this heavily populated country. The positive effect of ecotourism on lions is most noticeable in Liwonde National Park where a large and active game lodge at Mvuu Camp is central to the country's most successful wildlife protection efforts. Two immigrant lions have established themselves within the last year, presumably originating from Mozambique (T. Ferrar, pers. comm.). The tourism camp in Liwonde NP provides considerable benefits to local communities and to the conservation agencies and NGOs active in the area. It is the largest tourism operation in any of the Parks holding lions. A much smaller tourism operation at Vwaza Marsh Wildlife Reserve also has a beneficial effect on wildlife around Lake Kazuni, including lions.

In Zimbabwe, non-consumptive use of lion consists of wildlife viewing and wildlife photography:

- In State lands: National Parks and some other Protected Areas such as Matetsi Hunting Blocks;
- In some communal lands on the Kariba lake shore and in the Zambezi valley, and;
- Less so in private lands, except for a few conservancies.

The wildlife viewing tourism has declined steeply since 2000 following civil unrest, and currently, non-consumptive tourism is at a low level while tourist hunting is remaining quite stable.

In South Africa, most game reserves have tourism infrastructure and lions form an important component of the wildlife experience and serve as a major draw card for tourists to the Parks and Reserves. In general, the impact of use on lion conservation is positive in South Africa as this is a mechanism by which revenue is created. In Kwandwe, the reintroduction of lions will be beneficial provided the lions prey on the common species and do not kill the disease-free buffalo and black rhino. Currently at Kwandwe, the lions are feeding on the endemic and abundant kudu and warthog populations.

2.2. LION HUNTING

Several modes of hunting are practised in SSA, however two main categories are presented here:

(i) Local hunting which is understood as the offtake of lions by local communities for various purposes, either positive (source of any kind of benefit including social and cultural) or negative (e.g. destruction of problem animals) and;
(ii) Tourist hunting considered as the cropping of lion (essentially adult males) for sport and trophy collection by tourist hunters, either resident or expatriates.

- **Local hunting**

- *Western Africa*

In Western Africa there is probably relatively little local lion hunting occurring, although pastoralists may shoot or poison lions in order to protect their stock. But not much data is available about the overall effects of local hunting in the region. Data is sparse in this area, which may account for the small number of lions hunted each year.

- *Central Africa*

The situation of Central Africa may be slightly different from that of West Africa, in that more lions occur as well as more lion depredation. Very little quantitative data is available. However it is safe to assume that a number of lions are killed each year in defence of stock, especially in situations where transient cattle-herders enter into Protected Areas.

- *Eastern Africa*

In Kenya, there are widespread traditional cultural uses, notably of lions speared. In the Masai communities, when a particularly large-maned lion is killed, the mane is taken and used at ceremonies or hung upon the warrior's village flag pole. When a lion is killed, the tail is cut off and becomes the property of the warrior who put the first spear in. After the initial celebrations this tail is discarded. Paws are also cut off and used in the celebrations and then also discarded. Paws and teeth appear not to be kept. In the case of poisoning nothing is taken (A. Radcliffe, pers. comm.).

- *Southern Africa*

The lion does not appear as a common major species for local hunting in this region. However, more in-depth studies are needed to explore this interesting subject.

- **Tourist hunting**

- *Sub-Saharan Africa*

In SSA, out of 32 countries which are permanent lion Range States, a total of 13 countries (40%) operate lion tourist hunting activities (Tables 24, 25, 26, 27).

In 2001, the Executive Director of UNEP, Dr. Klaus Töpfer, declared: "*The sustainable utilisation of wild animals through trophy hunting offers economic incentives to the local rural population, reduces poaching and offers incentives to conserve critical habitat*". Tourist hunting has quite different characteristics from other forms of off-take in that the harvest is usually confined to a relatively minute segment of the population so that the impact on the population is very small (Bell & McShane-Caluzi, 1984). In most cases, it is preferable to

control lion numbers by trophy hunting, which provides a source of revenue which can then be allocated to wildlife conservation, rather than by poisoning, culling or PAC, which costs money and is a waste of the resource, giving no revenue to rural people.

The closure of all hunting, or only lion hunting, in a few countries, suppresses much needed income from nature-oriented activities in huge tracts of natural habitats which are unsuitable areas for photographic safaris (often several million hectares of wilderness) and consequently gives place to alternative activities which are detrimental to the whole biodiversity, e.g. agriculture or excessive grazing by domestic stock.

Lion hunting quotas should be allocated yearly, based on the knowledge of wildlife managers in the field, since lion populations can vary considerably from one year to the next, with a large increase if food is abundant or with a significant decrease in case of disease, excessive offtake or low abundance of prey. Quotas can then be adjusted accordingly (Table 28).

TABLE 28 - SUGGESTED LION QUOTA (% OF LION POPULATION PER YEAR)

Category	Maximum offtake (%)		Source
	Max. sustainable off.	Max. sport hunting off.	
Lioness	6	3	WWF, 1997
Male lion	6	5	WWF, 1997
Mature male lions	10		Greene *et al.* (1998) *in* Loveridge, 2002
	2-3		Creel & Creel (1997) *in* Loveridge, 2002
Total lion population	8		Jachmann, 2001
	10		Cumming *in* Bell & McShane-Caluzi (eds.), 1984

- *Western Africa*

Out of 15 countries in the Western Africa region, 3 countries (one fifth) allow lion tourist hunting (Table 24).

In this region, the lion is not the main species sought after by tourist hunters who preferably look for buffalo, roan, hartebeest and medium-size game. However, (i) to hunt other species in lion habitat, (ii) the little although real chance to see a lion during a hunting party, (iii) and the even smaller chance to collect a lion trophy, remain a powerful attraction for the tourism hunting market in these countries. When booking a hunting trip, the tourist hunter is not only buying a hunt he is also dreaming of the whole atmosphere and of remote opportunities of approaching flagship and charismatic animals such as lion.

The average total number of adult male lions taken by tourist hunters in the Western Africa region is about 18.5 per year (Table 29). The first destination for lion tourist hunting in Western Africa is Burkina Faso with a stable number of 12 animals collected per year on a regular basis since now 20 years, which is a good indication of an appropriate quota allocation system.

In the region, only one out of 16 tourist hunters is lucky enough to collect a lion, which is a rough assessment, since not all big game hunters are pursuing lion.

The total hunting area necessary to collect a single lion is about 26,000 km², the actual surface area hunted for lion being 14,000 km² per lion collected.

TABLE 29 - LION TOURIST HUNTING IN WESTERN AFRICA

		Senegal	Burkina Faso	Benin	Total Western Africa
Average lion offtake per year	**Number of individuals**	1	12	5.5	18.5
	% out of estimated population	3.2	2.8	2.2	
Big game tourist hunting	**Number of licenses per year**	15	200	80	295
	Average duration of a hunting safari (days)	6	6	9	
Surface (km²)	**Total hunting area**	13,080	7,500	5,100	25,680
	Area hunted for lion	2,000	7,500	4,500	14,000
Hunting success rates (n° of lions hunted)	**Per license & per day**	0.011	0.010	0.008	
	Per 100 km²	0.05	0.16	0.12	

- *Central Africa*

Out of the 9 countries in the Central Africa region, 3 countries (one third) allow lion tourist hunting (Table 25).

In this region, the lion is playing a similar role for tourist hunting as in the Western African region. The lion is not the main species sought after by tourist hunters who preferably look after elephant, giant eland, bongo, buffalo, roan, hartebeest, korrigum and medium-sized game.

The average total number of adult male lions taken by tourist hunters in the Central Africa region is about 17.4 per year, a number comparable to that of Western Africa (Table 30), so that the total number of lions taken by tourist hunters in the whole Western and Central Africa regions reaches about 36 animals per year.

The first destination for lion tourist hunting in Central Africa is Cameroon with a steady number of 9 animals collected per year on a regular basis over the last 20 years, which is an indication of a conservative quota allocation system.

In the region, only one out of 18 tourist hunters is lucky enough to collect a lion, which is a rough assessment, since not all big game hunters are searching for lions.

The total hunting area necessary to collect a single lion is about 59,000 km², the actual surface area hunted for lion being 34,000 km² per lion collected.

TABLE 30 - LION TOURIST HUNTING IN CENTRAL AFRICA

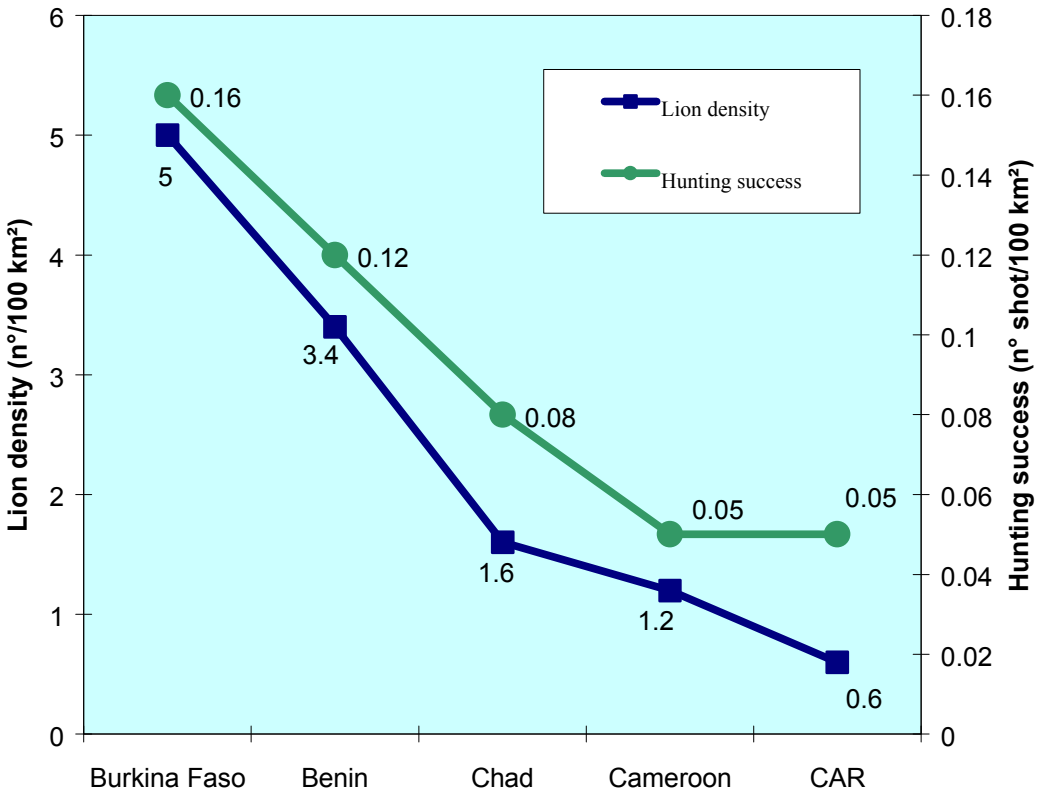
		Cameroon	Chad	C.A.R.	Total Central Africa
Average lion offtake per year	**Number of individuals**	9.4	3	5	17.4
	% out of estimated population	2.7	3.2	2.8	
Big game tourist hunting	**Number of licences per year**	150	10	150	310
	Average duration of a hunting safari (days)	12	10	13	
Surface (km²)	**Total hunting area**	23,000	6,000	30,000	59,000
	Area hunted for lion	20,000	4,000	10,000	34,000
Hunting success rates (n° of lions hunted)	**Per licence & per day**	0.005	0.030	0.003	
	Per 100 km²	0.05	0.08	0.05	

Lion hunting results in Western and Central Africa (Tables 20 & 30) provide interesting parameters to evaluate lion densities. Measuring the catch-per-unit effort (CPUE) is one way of assessing lion densities when the hunting efforts are stable year after year. In five countries where lion hunting is conducted, the lion density has been respectively compared with the lion hunting success (number of lions trophy-hunted per 100 km²) (Figure 6). The comparison is based on the following facts:

- The number of lions hunted is the average of the last 10 years (Benin) or 20 years (Burkina Faso) years, except for Chad (several years);
- The number of hunters is much higher than the number of lions hunted;
- The number of hunters is roughly stable, and;
- The number of hunting days per hunter is constant over the years.

Basically, the hunting effort may be considered as constant. In sustainable conditions, the 2 curves are closely parallel, which is the case for Burkina Faso, Benin and Cameroon. When the hunting pressure increases, the two curves diverge, which is the case for CAR and Chad. At this stage it may be useful to remind that an increase of hunting pressure may result from either an increasing total number of hunting days with a stable lion population, or a decreasing number of lions (for one reason or another) with a stable number of hunting days.

FIG. 6 - LION DENSITY AND HUNTING SUCCESS IN WESTERN AND CENTRAL AFRICA



- *Eastern Africa*

Out of 8 countries in the Eastern Africa region, 2 countries only (one quarter) allow lion tourist hunting (Table 26).

In Tanzania, consumptive use is not allowed in National Parks and in some Reserves (Mkomasi, Saadani). The major form of consumptive use is through trophy hunting by tourists, but lions are also destroyed through problem animal control (PAC) which is carried out by wildlife officials. Lions are also poisoned by herdsmen, and get caught in snares laid by poachers for other animals. Tourist hunters operate in allocated Hunting Blocks. Currently around 110 Hunting Blocks are being utilised (the number of Hunting Blocks varies slightly from year to year). The overall quota of lions is around 500 per year (516 in 1996). The trophy hunting offtake is around 50 % of the quota: on the average 250 lions are taken every year in Tanzania (236 in 1996). This offtake appears to be sustainable, as hunting success has remained fairly even since safari hunting was fully re-established in the late 1980's. The tourist hunting quotas are set for each species allowed to be hunted during the year for each Hunting Block. However, as hunting permits are issued on a block basis, hunting success varies between blocks depending on the occurrence and distribution of lions, which in turn depends on a multitude of environmental factors and can thus fluctuate from year to year. Unless problems as to the availability of lions and hunting success are reported, the same quota will be issued for the following season. This method implies that when there are problems reported from certain Hunting Blocks, such as sickness amongst the lions or non-availability of trophy males, the quota is adjusted downwards depending on local population dynamics. In some cases additional animals have been added to the quota in particular blocks.

In Tanzania, sport hunting generally makes a positive contribution to the local economy. Under the new laws (Wildlife Policy of Tanzania, WPT, 1998 and the new Wildlife Management Area (WMA) Regulations, 2001), benefits from trophy hunting and ecotourism will go directly to the local communities. Under these new laws, local communities can draw up contracts with hunting companies and lodges etc. In pilot projects this has proven a major incentive for villagers to conserve and protect game on their village land. Giving wildlife an economic value from the perspective of the primary stakeholders namely the villagers encourages sustainable management of the resource. At the same time socio-economic development is furthered, as more cash is available in the village, villagers are empowered and management capabilities strengthened. The Selous Game Reserve generated US$1.28 million in 1992. Lions generated 12% - 13% of this income (Creel & Creel, 1997).

In Somalia, tourist hunting was reported to occur during Siad Barre's regime up until 1991 with hunters coming from the Arab States. The continuing civil unrest in Somalia has reportedly stopped such hunting.

- *Southern Africa*

Out of 8 countries in the Southern Africa region, 5 countries (two thirds) allow lion tourist hunting (Table 27). In the Southern African region, tourist hunting is often the main source of profit generated by wildlife (Luxmoore, 1985).

In Namibia, the national total quota ranges between 0.4 and 0.9% of the overall lion population. Local quotas do not exceed 5% of the adult and sub-adult numbers. Trophy hunting quotas exist for Kaudom (Nyae Nyae Conservancy) and Caprivi sub-populations:

. Kaudom has a mean annual quota of between 0.7, which represents about 2.2% of the population (1997-2001), and;
. Caprivi has a mean annual hunting quota of 1.4, which is about 2.8% of the population (1996-2001).

In Namibia, lion quotas are often set based on the frequency of problems experienced with lions. According to P. Stander (pers. comm.), trophy hunting in this country does not have a measurable impact on lion conservation. An attempt is being made to involve local communities and redirect financial benefits from trophy hunting fees to curb losses due to lion predation on their livestock.

In Botswana, trophy hunting of lions with no baiting is traditionally allowed at a national level. Generally trophy hunting takes place in the areas less suitable for photographic safaris. Sustainable trophy hunting and problem animal control take place in the Okavango Delta. Lion survey data are used to set quotas in the Okavango Delta Wildlife Management Areas. The quota, set at less than 1% offtake for trophy hunting in the Okavango Delta, is determined by the DWNP. Problem animal control along the boundaries of Protected Areas (National Parks, Game Reserves and Wildlife Management Areas combined) forms the largest part of the offtake. Hunting of lion in the Dry North is considered not sustainable and the quota is to be reviewed after a proper survey has been conducted to ensure sustainability. There is no trophy quota in the Pans region, but problem animal control was not thought to be sustainable. A lion PAC and lion hunting ban was imposed in November 2000. The following sport hunting quotas were given for the year 2000:

- Okavango Delta:	12
- Linyanti/Chobe river:	3
- Dry North:	14
- Pans:	0
- Central and Southern Botswana:	10
Total (national):	39

In Botswana, commercial photographic and multiple use Wildlife Management Areas are on 15-year leases. An annual fee is paid to the Government and a resource utilisation fee to the local Government. Community Wildlife Management Areas with a Community Trust Fund are leased to operators or communities engaging in joint ventures with operators. A resource fee is paid to local Government. A trophy hunting licence fee is paid to Government. Financial benefits are not enough to accrue to the conservation body. Photographic camps and hunting camps are, however, the largest job providers. The Northern Region's economy is driven by tourism.

In South Africa, very limited hunting of lion takes place in Krugerís surrounding reserves. Quotas are based on advisory committee meetings with limited availabilty of data. In Mpumalanga Parks, offtake is reactive. The only offtake of lions in Hluhluwe-Umfolozi is for research purposes when animals are sick or in poor condition. The removals in the North West Parks are sporadic and no fixed annual quota exists for lion but rather animals are made available for hunting to achieve various management objectives. In such cases individual animals are identified for removal and then tendered to hunting operators who then offer a ìclassic huntî within the reserve (less than one lion per year on average). In South Africa, North West Parks and Hluhluwe-Umfolozi (Kwazulu-Natal) achieve their various management objectives through lion utilization. Very limited benefits are derived from lion

utilization in Mpumalanga Parks. Phinda gains exposure through their relocation programmes and revenue is derived (although lions are donated to state-owned reserves). In Kwandwe and Shamwari, lions are flagship species and essential for photographic tourism operations. Without them, benefits through revenue generation would be severely reduced as tourists want to see the 'Big 5".

In Zimbabwe, consumptive use mainly consists of trophy hunting mostly by foreign tourists, but also for problem animal control. Skins and skulls are taken as trophies. During the year 2000, foreign hunters paid a total of US$1,859,932 to the safari operators who conducted the hunts, for a total of 91 lions trophy-hunted. Lions account for only about 2% of sport hunting revenue earned by Rural District Councils in those Communal Lands where CAMPFIRE programmes operate (Bond, 1994). No precise data are currently available on the total annual offtake of lions, apart from the animals collected by tourist hunters. Therefore, no opinion can be offered on the sustainability of the annual offtake of lions, but quotas give an upper limit. At present, there is no evidence that consumptive and/or non-consumptive uses are having any measurable impact on the number of lions in Zimbabwe (V. Booth, pers. comm.). Lion sport hunting quotas for Parks and Wild Life Estate, Forest Lands and Communal Lands for the year 2002 were the following (N. Masulani, pers. comm.):

- Unflooded Middle Zambezi Valley:	40
- Sebungwe:	17
- North-west Matabeleland:	66
- South-east Lowveld:	12
- Southern Zimbabwe:	4
Total (national):	139

The quotas for year 2000 were reportedly similar to that planned for 2002 (above) (N. Masulani, pers. comm.). The quotas for 2001 were reported to have been 224 (N. Monk, pers. comm.). It is doubtful that the variation in these numbers actually closely reflects a variation in the number of lions:

- In the Parks and Wildlife Estate, the Department of National Parks and Wildlife Management (DNPWM) sets sport hunting quotas after consultation with stakeholders. Information that is considered during quota setting includes: survey results (if any), the perceived trend in lion numbers, trophy quality and animal condition data (if any) during the previous year, and stakeholders' opinions on lion numbers and trends;
- In the Communal Areas, the appropriate authority proposes sport hunting quotas, which are then sent to that DNPWM for approval, and;
- On privately owned land, sport-hunting quotas are proposed by the landowner and then sent to the DNPWM for approval.

In Zambia, interest in lion from safari hunters is substantial and growing. Over the 1995-2000 period, lions have been hunted successfully in the prime, secondary and even some of the under-stocked Game Management Areas (GMA's). It is interesting to note that fewer licences for lion were issued than were available on quota. Hunting pressure on lion and their prey (plains game species) in the GMA's is largely seasonal. Poor access by road and even on foot (particularly in the floodplain areas), dense vegetation, and the dispersed nature of wildlife populations during the wet season months between December and May, largely preclude successful hunting of lion and their prey during this period. In contrast, throughout the dry

season months, hunting pressure on lion and other species is sustained at high levels, not only from safari hunting, but also through hunting by Special Licence (often not accountable against quotas), local hunting, poaching and snaring activity. With many GMA's sharing boundaries with the principal National Parks, particularly along the major rivers, this hunting activity continues right along the boundaries of the National Parks. The total number of lions hunted in 2000 amounted to 78. In Zambia, based on more than 20 years' experience, it is estimated that trophy male offtake quotas can be set up to 8 % of the adult lion population, in order to obtain the best male trophy quality (Jachmann, 2001). The quotas allocated for safari and resident hunting are broadly based on prior hunting success rates, but in some cases purely on levels of demand. Systematic assessments of hunting returns can and have been used fairly successfully by the authorities to determine sustainable hunting quotas, but this procedure is likely to have lapsed in recent years during the process of institutional changes in the wildlife authorities (R. Jeffery, pers. comm.; J. Pope, pers. comm.).

In Malawi, no sport or trophy hunting of lions is permitted and none has been considered for many years, since lions are scarce in this country.

2.3. LION TRADE

An attempt is made to investigate the possible impact of both existing national and international trade in lion products.

- **Domestic trade**

There appears to be very little poaching activity specifically aimed at lions. However, lions are indirectly at risk as a result of illegal snaring operations, which are targeting large ungulates, and some lions will inevitably get caught accidentally. As discussed before, lions are also destroyed by cattle-herders for protection purposes and their by-products may then appear on the market. One can find a few skulls, skins and claws, mainly for medicinal or cultural purposes (the lion still carries a strong socio-cultural image for a number of ethnic groups), on local markets in Africa, but they are probably mainly by-products of poached stock-raiding lions. As far as lion is concerned, there is no evidence of any large-scale demand driven commercial activity such as is seen in the trade in tiger bones in Asia.

At the national level, there is practically no trade in lions or their products, with the exception in Southern Africa of some trade in live animals for translocation purposes from one wildlife reserve to another (reinforcement, reintroduction or even introduction).

- *Western and Central Africa*

In this region a few lion products may be seen exposed on local markets here and there, but never in large numbers. Claws are the most widespread, often in jeweller's shops. The odd skull appears also for sale, usually in traditional medicine stands in local markets, but they often look like they actually did not find any buyer for a number of years.

- *Eastern Africa*

In Tanzania, there is no legal trade of significant dimension and what does occur is unlikely to impact on the overall lion populations. However, there is some illegal domestic trade with a

demand for claws, teeth and tails, mostly used for witchcraft. Lion fat is used for medicinal purposes, e.g. to treat sore muscles. The extent of this trade cannot be estimated, but there are reports of lions killed for these products, even though the official version may oftent be PAC. The Wildlife Conservation Act 1974 controls the offtake and the trade in lion products. Ownership of any lion product requires a certificate, which is only issued for legally acquired lion products, for instance, from sales after PAC. Any change in ownership requires a change of certificate.

- *Southern Africa*

In Namibia, keeping and trade in lions in captivity is regulated through the Ministry of Environmental Affairs and Tourism Policy.

In Botswana, a limited number of lion pelts from PAC are sold at public auction by the Department of Wildlife and National Parks (DWNP).

In South Africa, no trade in lions/lion products to/from Kruger National Park takes place because the population is suffering from various diseases such as BTB or FIV, and very little trade takes place in the surrounding areas for the same reason. The Kgalagadi Transfrontier Park has no trade in lions/lion products. North West Parks lions have been sought after for relocation because (i) of the absence of lion disease, (ii) their lions are of known genetic origin (Etosha National Park) and (iii) their lions are tourist habituated. Phinda relocates excess lions to reserves in the Northern Province and Mpumalanga. Reintroduction of lions from Pilanesberg and Madikwe to Hluhluwe-Umfolozi has been ongoing since 2000.

- **International trade**

International trade is monitored to prevent trade from having a negative impact on the conservation status of species, even though, in some cases, international wildlife trade can provide a positive incentive for the conservation of wild fauna and flora (IUCN *et al.*, 1991).

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES or Washington Convention) was adopted in 1973 precisely to ensure that no species disappeared because of international trade. This Convention, which operates under the umbrella of the United Nations Environment Programme (UNEP) (158 countries are signatory to the Convention) regulates international trade of about thirty thousand species of wild fauna and flora listed under three Appendices.

Panthera leo was listed on CITES Appendix III in February 1976, at the request of Ghana. Later, it was transferred to Appendix II of the Convention on the occasion of the first session of the Conference of the Parties (Bern, Switzerland, November 1976).

This status implies that the export of any lion, alive or dead, or of parts or products of a lion, is submitted to the delivery of a CITES permit prior to export by the authorities of the country from where it is exported. Some countries or communities of countries have adopted a stricter legislation than CITES itself. According to these "stricter domestic measures", the introduction into their territory of specimens derived from species listed on Appendix II of the Convention also requires for an import permit to be issued.

Every CITES Party must report yearly to the World Conservation Monitoring Centre (WCMC) of the UNEP, on all permits delivered within the framework of the Convention. Therefore, the WCMC database constitutes the best source of information available to monitor legal international trade, notably from the point of view of the nature of trade, its volume and origin. As far as lion trade is concerned, this survey is based on the data relative to years 1991 to 2000, as provided by WCMC/UNEP.

The word "specimen" is used according to its CITES definition, i.e. it can refer to a live lion as well as to a complete stuffed lion, to a trophy made of the skull, the skin and the claws, only consisting of a skin, to a claw as jewellery or to a very small piece of skin collected for scientific analysis purposes (Table 31).

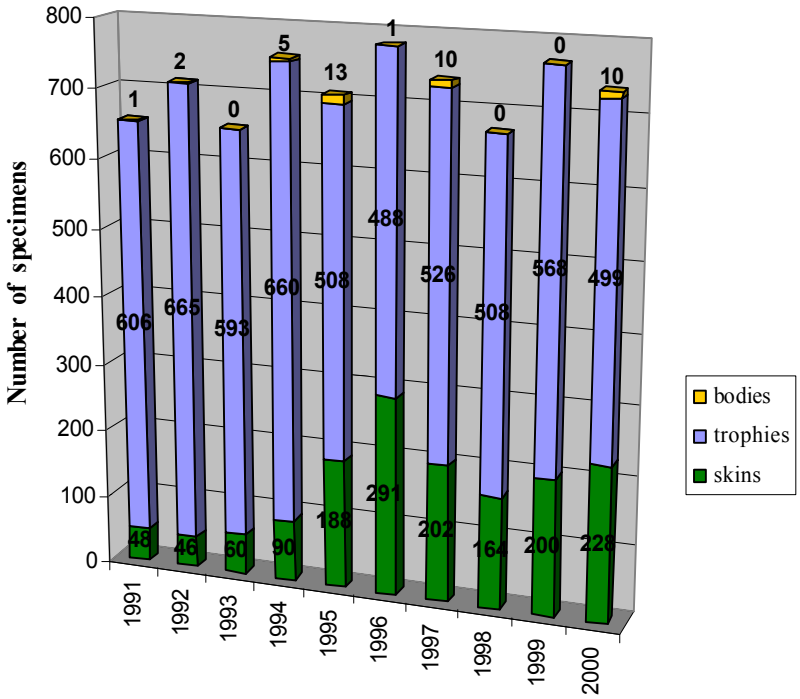
TABLE 31 - EXPORTS OF *Panthera leo* ALL TYPES SPECIMENS, 1991-2000 WORLDWIDE TRADE (Source: UNEP-WCMC CITES Trade Database, 2001)

Products	Code	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total
Bone carvings	BOC	0	0	0	1	1	1	0	0	0	0	**3**
Bodies	BOD	2	4	5	7	20	7	12	1	6	20	**84**
Bones	BON	1	1	0	0	6	1	2	3	0	6	**20**
Piece of bone	BOP	0	0	0	0	0	0	0	3	0	0	**3**
Bone products	BPR	2	0	0	0	0	0	0	0	0	0	**2**
Carvings	CAR	148	1	18	0	0	0	0	0	0	0	**167**
Claws	CLA	834	27	1,038	117	794	582	1,232	120	72	322	**5,138**
Cloth	CLO	0	0	0	0	0	0	0	0	8	0	**8**
Derivatives	DER	0	1	0	0	0	0	0	0	0	0	**1**
Feet	FOO	4	0	0	0	1	0	0	0	0	56	**61**
Garments	GAR	0	0	0	0	0	0	0	0	1	0	**1**
Hair	HAI	0	0	0	0	0	0	0	0	0	1	**1**
Handbags	HAN	0	0	3	0	0	0	1	0	0	0	**4**
Live specimens	LIV	146	188	196	163	209	178	217	253	278	176	**2,004**
Leather product (large)	LPL	0	0	0	0	0	0	1	0	1	2	**4**
Leather product (small)	LPS	0	0	0	43	0	0	0	1	4	6	**54**
Plates	PLA	0	3	0	0	2	1	0	0	0	1	**7**
Pairs of shoes	SHO	0	0	0	0	0	0	0	0	0	0	**0**
Skeletons	SKE	0	1	0	1	0	0	0	2	0	4	**8**
Skins	SKI	52	49	63	93	192	313	203	178	214	233	**1,590**
Skin/leather items	SKO	2	0	0	1	0	0	0	0	0	0	**3**
Skin pieces	SKP	0	0	0	1	3	0	0	2	0	0	**6**
Skulls	SKU	134	42	92	45	104	20	12	123	139	196	**907**
Scientific specimens	SPE	0	341	217	237	407	235	149	219	179	6	**1,990**
Tails	TAI	0	0	0	0	0	0	0	0	1	0	**1**
Teeth	TEE	18	0	0	2	7	0	0	0	231	4	**262**
Trophies	TRO	630	679	606	687	523	505	549	518	590	667	**5,954**
Unspecified	UNS	0	0	0	2	0	1	0	0	0	0	**3**
Wallets	WAL	1	0	0	0	0	0	0	0	0	0	**1**

It is safe however to assume that both a "live lion" (code LIV) and a "whole stuffed lion" (code BOD) obviously correspond to an entire animal. However, the other specimen categories unfortunately do not allow to determine an exact figure of animals collected since, for example, when a skin and a skull are exported separately, these two specimens can obviously correspond to the same lion. It is also possible that lion "parts" such as feet, teeth, claws and tails, even though exported under the corresponding codes (FOO, TEE, CLA et TAI), should be considered as "secondary" trophy components. Therefore, some of them can correspond to a lion whose "main" elements have been exported under code TRO, SKI or SKU. Consequently, the results below are based on the analysis of the exports registered by WCMC as corresponding to "main" elements of trophies (bodies, trophies, skins and skulls).

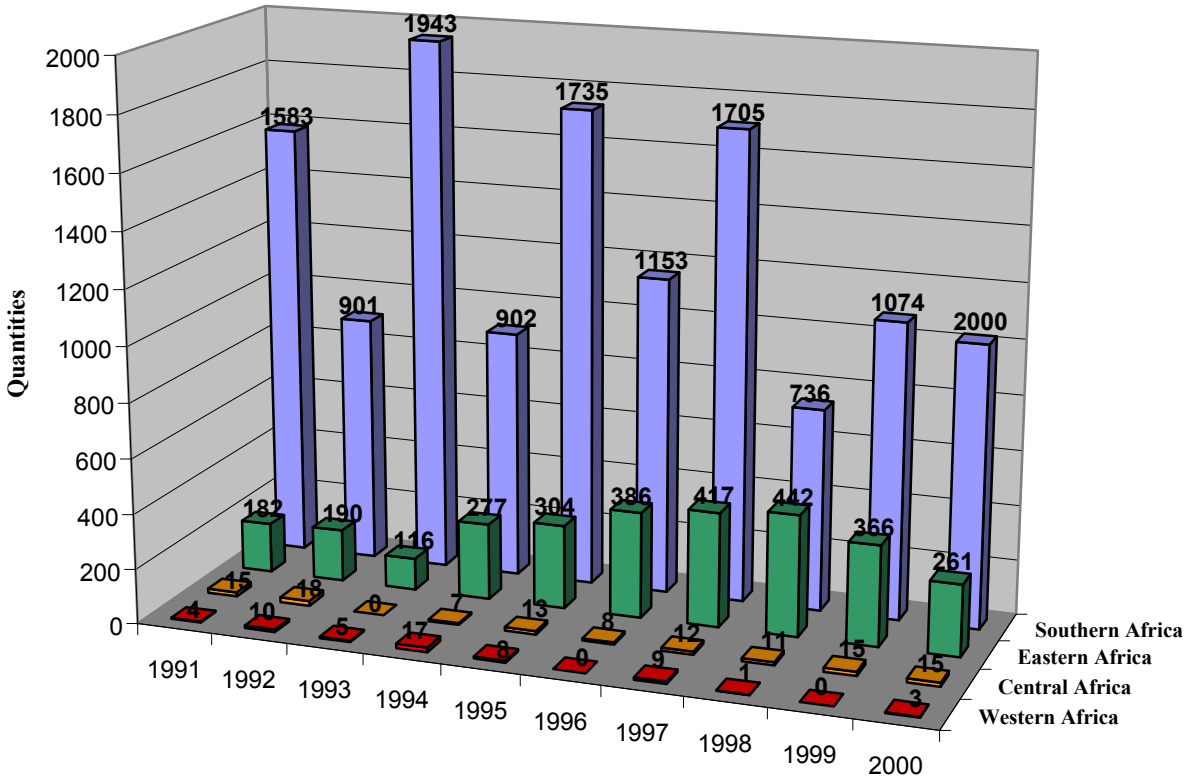
The respective role of the Range and non Range States in the trade is clear in the difference between live and non-live sales. While the hunting trophies obviously come from the Range States (Figure 7), 85 % of the live lions which have been internationally traded during the period under consideration (1991 - 2000) have been exported from non Range States of the taxon (Figure 9), and reflects the number of captive animals being traded between zoos and wildlife parks but is not necessarily germane to this report.

FIG. 7 - RANGE STATE EXPORTS OF *Panthera leo* HUNTING TROPHIES, 1991-2000 (Source: UNEP-WCMC CITES Trade Database, 2001)



The majority of the exports from Range States (all specimens considered) come from Southern Africa and, to a lesser extent (1 out of 4), from Eastern Africa (Figure 8). Western and Central Africa only account for less than 1 % in the number of lion products in international trade.

FIG. 8 - REGIONAL DISTRIBUTION OF ANNUAL RANGE STATES EXPORTS FOR ALL *Panthera leo* PRODUCTS 1991-2000 (Source: UNEP-WCMC-CITES Trade Database, 2001)



As it can be deducted from the table above (Table 31), the number of lions internationally traded is essentially made up of four main categories:

(i) Live specimens;
(ii) Specimens used for scientific purposes ;
(iii) Hunting trophies, and ;
(iv) Other specimens.

(i) Live specimens

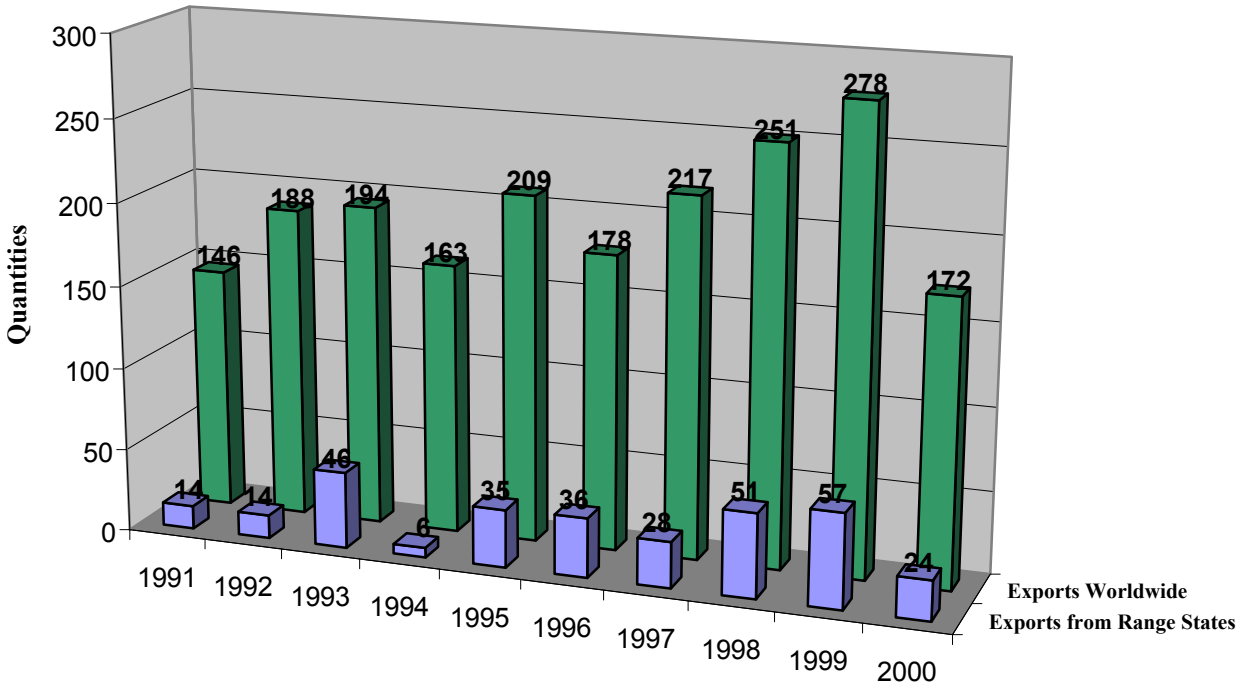
These specimens are mainly sold between zoos and wildlife parks, circuses or, for a very small number, to be translocated into the wild for reinforcement (to increase numbers of an existing population and to enlarge its gene pool), reintroduction or introduction purposes.

During the period under consideration (1991-2000) 2,004 live specimens (i.e. 2,004 lions) have been exported, i.e. about 200 live lions per year. Only few of these have originated from Range States: during the period under consideration, 10 Range States have exported a total number of 305 live lions, representing only 15 % of the worldwide trade in this category of specimens (Figure 9). South Africa (164), Namibia (84) and Zimbabwe (30) were the three main exporters of live lions, but it can be seen that, out of that total, only 87 were taken from the wild (Table 32). As a result, since exports of live lions mainly concern specimens originating from zoos, wildlife parks or other establishments where they are bred in captivity, it may be assessed that this trade has a negligible impact on free-ranging lion conservation status.

TABLE 32 - EXPORT OF LIVE AFRICAN LIONS BY RANGE STATES BETWEEN 1991 AND 2000 (Source: UNEP-WCMC CITES Trade Database, 2001)

Country	Number of live lions exported by Range States between 1991 and 2000	
	Total number	Number taken from the wild
Ethiopia	2	-
Kenya	13	4
Malawi	6	6
Namibia	84	25
Niger	2	-
Senegal	4	-
South Africa	164	29
Tanzania	4	2
Zambia	2	2
Zimbabwe	30	19
Total	305	87

FIG. 9 – SHARE OF RANGE STATES EXPORTS AS COMPARED TO WORLDWIDE TRADE IN *Panthera leo* LIVE SPECIMENS (Source: UNEP-WCMC CITES Trade Database, 2001)



(ii) Specimens used for scientific purposes

A total number of 1,990 "specimens" belonging to this category were exported over the same 10 year period, i.e. about 200 per year.

It is worth noting that:

- Some of these scientific specimens may have been collected on live lions, and;
- They often correspond to small pieces of skin, hair, etc.

(iii) Hunting trophies

CITES Notification 2002/022 of 9 April 2002 states the following guidelines:

- Exports "of substantially dead animals, […] whole stuffed hunting trophies" must be exported under code BOD;
- When all the trophy parts of one animal are exported together (as far as lion is concerned: the skin, the skull, the feet, the claws, the teeth, the tail), it has to be considered that they make up a trophy and that therefore they should be exported under code TRO; however, when the skull and the skin are the sole specimens of an animal which are exported, they should also be registered together as a trophy (TRO);

- A skin alone should be registered under code SKI, and;
- Similarly, a skull alone should be registered under code SKU, claws under code CLA, etc.

Therefore, a specimen exported under code BOD, either may be a hunting trophy, fully mounted by a taxidermist in the Range State of origin, or it can be a whole stuffed lion which is exchanged from one Museum to another.

Very often, CITES permits do not mention separately the different parts which make up a hunting trophy. As far as lion are concerned, hunting trophies are essentially made up of the skin, skull and claws (UNEP-WCMC CITES Trade Database, 2001). In spite of the guidelines set out by the Convention, the skull, the skin and the claws exported as "hunting trophy" can eventually be registered under three different codes (SKU, SKI or CLA) rather than under the single code TRO (hunting trophy). This largely depends on the personal interpretation of the agent in charge of the export permit issuance. For this reason, the annual average figure of 700 lions/year, exported by tourist hunters, is probably overestimated for the two main following reasons:

- More than one permit may be issued under code TRO for a number of specimens which are parts of the same lion, rather than corresponding to different lions, and;
- It is possible that some permits delivered under code BOD do not correspond to hunting trophies.

The exporting Ranges States of lion hunting trophies may be classified in three categories, over the ten-year period under consideration (1991-2000) (Table 33):

1st: 14 countries have exported less than 100 African lion hunting trophies over the period, i.e. an average of 10 lions per year: Mali (0); Niger (0), Chad (1), DRC (1), Sudan (2), Senegal (4), Malawi (11), Kenya (12), Benin (13), CAR (20), Burkina Faso (34), Ethiopia (42), Mozambique (84), Cameroon (98);

2d: 2 countries exported between 100 and 1000 hunting trophies over the 10 year period: Namibia (188) and Zambia (368), and;

3d: 4 countries exported more than 1000 trophies over the period: Botswana (1,008), Zimbabwe (1,078), South Africa (1,990) and Tanzania (2,226).

TABLE 33 - EXPORTS OF *Panthera leo* HUNTING TROPHIES BY RANGE STATES (Source: UNEP-WCMC CITES Trade Database, 2001)

Years	**1991**				**1992**				**1993**				**1994**				**1995**			
Products	**SKI**	**TRO**	**BOD**	**Sub-t.**	**SKI**	**TRO**	**BOD**	**Sub-t.**	**SKI**	**TRO**	**BOD**	**Sub-t.**	**SKI**	**TRO**	**BOD**	**Sub-t.**	**SKI**	**TRO**	**BOD**	**Sub-t.**
Burkina Faso		1		**1**		8		**8**		3		**3**		14		**14**		8		**8**
Benin				**0**				**0**				**0**		3		**3**				**0**
Botswana	15	71		**86**		123		**123**	13	149		**162**	31	1		**32**	28	13		**41**
Cameroon		15		**15**		18		**18**				**0**		1		**1**		6		**6**
Chad				**0**				**0**				**0**				**0**				**0**
CAR				**0**				**0**				**0**		6		**6**		7		**7**
DRC				**0**				**0**				**0**				**0**				**0**
Ethiopia				**0**	2			**2**	12	3		**15**		13		**13**	4	1		**5**
Kenya	2			**2**	1	2		**3**	3			**3**		1		**1**				**0**
Malawi				**0**				**0**	3			**3**	5			**5**	2			**2**
Mali				**0**				**0**				**0**				**0**				**0**
Mozambique		1		**1**				**0**				**0**				**0**		1		**1**
Namibia				**0**		30		**30**	6	14		**20**		21		**21**		23		**23**
Niger				**0**				**0**				**0**				**0**				**0**
Senegal		2		**2**	1	1		**2**				**0**				**0**				**0**
Sudan				**0**	2			**2**				**0**				**0**				**0**
South Africa	9	134		**143**	31	165	2	**198**	14	151		**165**	22	263	5	**290**	75	122	12	**209**
Tanzania	1	165	1	**167**		170		**170**		95		**95**	5	249		**254**		205		**205**
Zambia		51		**51**		12		**12**				**0**	7	50		**57**	6	61	1	**68**
Zimbabwe	21	166		**187**	9	136		**145**	9	178		**187**	20	38		**58**	73	61		**134**
Total	**48**	**606**	**1**	**655**	**46**	**665**	**2**	**713**	**60**	**593**	**0**	**653**	**90**	**660**	**5**	**755**	**188**	**508**	**13**	**709**

(continued)

Years	1996				1997				1998				1999				2000			
Products	**SKI**	**TRO**	**BOD**	**Sub-t.**	**SKI**	**TRO**	**BOD**	**Sub-t.**	**SKI**	**TRO**	**BOD**	**Sub-t.**	**SKI**	**TRO**	**BOD**	**Sub-t.**	**SKI**	**TRO**	**BOD**	**Sub-t.**
Burkina Faso				**0**				**0**				**0**				**0**				**0**
Benin				**0**		9		**9**		1		**1**				**0**				**0**
Botswana	234	9	1	**244**	79	15		**94**	63			**63**	94	13		**107**	56			**56**
Cameroon		8		**8**		12		**12**		9		**9**		15		**15**		14		**14**
Chad				**0**				**0**				**0**				**0**		1		**1**
CAR				**0**				**0**		2		**2**		5		**5**				**0**
DRC				**0**				**0**				**0**				**0**		1		**1**
Ethiopia	2			**2**				**0**	2			**2**		3		**3**				**0**
Kenya				**0**				**0**		1		**1**	1	1		**2**				**0**
Malawi	1			**1**				**0**				**0**				**0**				**0**
Mali				**0**				**0**				**0**				**0**				**0**
Mozambique	1	16		**17**		11		**11**		13		**13**	12			**12**		29		**29**
Namibia	21	3		**24**	17	7		**24**	10	8		**18**	6	7		**13**	6	9		**15**
Niger				**0**				**0**				**0**				**0**				**0**
Senegal				**0**				**0**				**0**				**0**				**0**
Sudan				**0**				**0**				**0**				**0**				**0**
South Africa	19	21		**40**	97	123	10	**230**	87	107		**194**	75	145		**220**	101	196	4	**301**
Tanzania		297		**297**		268		**268**		263		**263**		261		**261**		246		**246**
Zambia		31		**31**				**0**		80		**80**	1	68		**69**				**0**
Zimbabwe	13	103		**116**	9	81		**90**	2	24		**26**	11	50		**61**	65	3	6	**74**
Total	**291**	**488**	**1**	**780**	**202**	**526**	**10**	**738**	**164**	**508**	**0**	**672**	**200**	**568**	**0**	**768**	**228**	**499**	**10**	**737**

(end)

(iv) Other specimens derived from the African lion

As far as the lion is concerned, 23 other types of products (specimens) such as bones, small items made of leather, teeth, feet, etc. enter in this category. Out of these 23 types of specimens, 17 are the object of a very small number of exports, which, in the scope of this study, can be considered as negligible with less than 10 specimens during the whole ten year period of this study (Table 31).

Lion's bones and feet (respectively 20 specimens under code BON and 61 specimens under code FOO), as well as small items made of lion leather (54 specimens, under code LPS) and teeth (262 specimens under code TEE) also appear in the trade over the period of the present study.

In fact, only the claws (5,138 specimens under code CLA) are exported in relatively high numbers (510 claws on average per year), probably as jewellery items.

If it seems hazardous to assume that each claw of a single lion is exported, which would make possible to deduce a corresponding number of animals from this figure, claws, teeth, feet and tails have generally to be considered as secondary elements of a trophy and therefore the number of corresponding lions are probably already accounted for in other categories.