

Table summarising common Human Wildlife Conflict management practices

| MANAGEMENT PRACTICES | SPECIES | COUNTRY/REGION | SUCCESSFUL | TYPE | STRENGTHS | WEAKNESSES | SOURCE OF INFORMATION |
|--|--|--|---------------|-------------------------|--|--|--|
| PREVENTATIVE STRATEGIES | | | | | | | |
| Artificial barriers: chain link fences along reserve boundary | Asian lion (<i>Panthera leo persica</i>) Leopard (<i>Panthera pardus</i>) | Gujarat, India | Mixed results | Short-term | <ul style="list-style-type: none"> Prevent wildlife roaming out of nature reserves Hinder illegal grazing | <ul style="list-style-type: none"> Not economically viable Obstruct the natural dispersal of target and other species | Vijayan & Pati, 2002 Population and Environment, 23 (6): 541-559 |
| Artificial barriers: along reserve boundary | Lion (<i>Panthera leo</i>) Leopard (<i>Panthera pardus</i>) Baboon (<i>Papio ursinus</i>) | Sengwa Wildlife Research Area, Zimbabwe | No | Short-term | <ul style="list-style-type: none"> Prevent livestock and humans from entering the protected areas | <ul style="list-style-type: none"> Do not prevent carnivores from roaming out of nature reserves | Butler, 2000 African Journal of Ecology, 38 (1):23-30 |
| Artificial barriers: stone wall, mud and brushwood fences surrounding properties | Tiger (<i>Panthera tigris</i>) Leopard (<i>Panthera pardus</i>) and many herbivores* | Rajasthan, India | Rarely | Short-term | <ul style="list-style-type: none"> Minimize crop damage and livestock depredation | <ul style="list-style-type: none"> Not always effective Expensive to install and maintain Can disturb ecological equilibrium | Sekhar, 1998 Environmental Conservation, 25 (2):160-171 |
| Artificial barriers: livestock pens with chain link ceilings | Snow leopard (<i>Uncia uncia</i>) Tibetan wolf (<i>Canis lupus chanku</i>) | Himachal Pradesh, India | Yes | Sustainable | <ul style="list-style-type: none"> Very effective in reducing livestock losses One time investment | <ul style="list-style-type: none"> Short-term remedy, do not resolve the problem | Mishra, 1997 Environmental Conservation, 24 (4):338-343 |
| Artificial barriers: enclosures (solid, wicker, acacia, wire) | Lion (<i>Panthera leo</i>) Leopard (<i>Panthera pardus</i>) Cheetah (<i>Acynonyx jubatus</i>) Spotted hyenas (<i>Crocuta crocuta</i>) | Laikipia District, Northern Kenya | Mixed results | Short-term | <ul style="list-style-type: none"> Reduce total livestock losses Traditional husbandry practices | <ul style="list-style-type: none"> Short-term remedy, do not resolve the problem | Ogada <i>et al.</i> , 2003 Conservation Biology, 17 (6):1521-1530 |
| Artificial barriers: fortified enclosures | Lion (<i>Panthera leo</i>) Leopard (<i>Panthera pardus</i>) Baboon (<i>Papio ursinus</i>) | Gokwe communal land, Zimbabwe | No | Short-term | <ul style="list-style-type: none"> The construction of an enclosure cover would substantially reduce livestock losses | <ul style="list-style-type: none"> Lions, leopards and baboons are able to jump over the enclosure | Butler, 2000 African Journal of Ecology, 38 (1):23-30 |
| Artificial barriers: electric fencing | Large mammals | Kenya | Yes | Potentially sustainable | <ul style="list-style-type: none"> Last longer than conventional fences Wider range of species can be controlled Aesthetically more appealing | <ul style="list-style-type: none"> High costs of installation and maintenance Can be damaged by lightning Slight increase in risk of causing fire | Hoare, 1992; Wildlife Kenya Service, 1996 Environmental Conservation, 19 (2):160-164 |
| Artificial barriers: electric fencing | African elephant (<i>Loxodonta africana</i>) | East Caprivi, Namibia | Yes | Potentially sustainable | <ul style="list-style-type: none"> Successful on a large scale Cost-effective | <ul style="list-style-type: none"> High costs of installation and maintenance Bull elephants can destroy the fence | O'Connell-Rodwell <i>et al.</i> , 2000 Biological Conservation, 93 (3):381-391 |
| Artificial barriers: moats | Large mammals | Africa | No | Short-term | <ul style="list-style-type: none"> Effective with heavy species, which cannot jump e.g. elephants, giraffes, wildebeests, buffalos | <ul style="list-style-type: none"> Difficult to dig moats Need proper maintenance Subject to serious soil erosion | Hoare, 1992 Environmental Conservation, 19 (2):160-165 |
| Artificial barriers: spiny cacti hedges | Large mammals | Africa | Mixed results | Sustainable | <ul style="list-style-type: none"> Successful with carnivores and ungulates Inexpensive | <ul style="list-style-type: none"> Not effective with baboons and elephants Slow to establish | Hoare, 1992 Environmental Conservation, 19 (2):160-165 |
| Natural barriers: rivers | Tiger (<i>Panthera tigris sumatrae</i>) | Sumatra, Indonesia | Yes | Sustainable | <ul style="list-style-type: none"> Do not require additional expenditure Do not disturb ecological equilibrium | <ul style="list-style-type: none"> Ensure natural separation but only in combination with forestry guards limiting human access and illegal activity | Nyphus & Tilson, 2004 Oryx, 38 (1):68-74 |
| Guarding | Tiger (<i>Panthera tigris</i>) Leopard (<i>Panthera pardus</i>) and many herbivores* | Rajasthan, India | Yes | Short-term | <ul style="list-style-type: none"> Do not require financial investment | <ul style="list-style-type: none"> Requires additional labour | Sekhar, 1998 Environmental Conservation, 25 (2):160-171 |
| Guarding with dogs and a large number of people | Lion (<i>Panthera leo</i>) Leopard (<i>Panthera pardus</i>) Cheetah (<i>Acynonyx jubatus</i>) Spotted hyena (<i>Crocuta crocuta</i>) | Laikipia District, Northern Kenya | Yes | Short-term | <ul style="list-style-type: none"> Deters predators from taking livestock from their enclosures | <ul style="list-style-type: none"> Requires additional labour | Ogada <i>et al.</i> , 2003 Conservation Biology 17 (6):1521-1530 |
| Guard dogs | Wolf (<i>Canis lupus</i>) | Europe, North Asia and North America | Mixed results | Short-term | <ul style="list-style-type: none"> Used effectively in Europe and North Asia Inexpensive | <ul style="list-style-type: none"> Less efficient in North America Effective only if livestock owners are present | Musiani <i>et al.</i> , 2003 Conservation Biology 17 (6):1538-1547 |
| Fladry barriers (red flagging strips, 1m x 7.5 cm) | Wolf (<i>Canis lupus</i>) Black bear (<i>Ursus americanus</i>) Bald eagles (<i>Haliaeetus leucocephalus</i>) | Wisconsin (USA) | Mixed results | Sustainable | <ul style="list-style-type: none"> Low cost establish and maintain | <ul style="list-style-type: none"> Partially successful with wolves Not effective with other predators e.g. black bears and bald eagles | Shivik <i>et al.</i> , 2003 Conservation Biology 17 (6):1531-1537 |
| Fladry barriers | Wolf (<i>Canis lupus</i>) | Idaho, Montana, Wyoming (USA) and Canada | Yes | Sustainable | <ul style="list-style-type: none"> Deter wolves from crossing the barrier for over two months | <ul style="list-style-type: none"> Highly specific to wolf Needs to be tested for habituation and where natural prey is absent Logistically difficult to maintain over a large area | Musiani <i>et al.</i> , 2003 Conservation Biology 17 (6):1538-1547 |
| Sound, light and fire | Asian elephant (<i>Elephas maximus</i>) | Simao (Yunnan Province), China | Mixed results | Short-term | <ul style="list-style-type: none"> Successful when the animals are not used to the stimulus | <ul style="list-style-type: none"> It may enrage the animals Regular use of the same device produces habituation | Zang and Wang, 2003 Biological Conservation, 112 (3):453-459 |
| Man-made salt ponds (2.5 m x 1.5 m) | Asian elephant (<i>Elephas maximus</i>) | Simao (Yunnan Province), China | Yes | Sustainable | <ul style="list-style-type: none"> Provide one of the resources that is sought out by elephants Stop elephants entering villages | <ul style="list-style-type: none"> Intensive labour Utilization of 1 ton of salt | Zang and Wang, 2003 Biological Conservation, 112 (3):453-459 |
| Warning calls | African elephant (<i>Loxodonta africana</i>) | East Caprivi, Namibia | No | Short-term | <ul style="list-style-type: none"> Successful when the calls are recorded from the same herd that is to be scared off | <ul style="list-style-type: none"> Limited use when the area supports large populations of migratory elephants | O'Connell-Rodwell <i>et al.</i> , 2000 Biological Conservation, 93 (3):381-391 |
| Trip alarm | African elephant (<i>Loxodonta africana</i>) | East Caprivi, Namibia | Mixed results | Short-term | <ul style="list-style-type: none"> Successful in protecting individual farms Cost-effective Important warning tool for farmers | <ul style="list-style-type: none"> Elephants move into neighbouring unprotected farms: limited success Needs to be tested for habituation Logistically difficult to protect large areas | O'Connell-Rodwell <i>et al.</i> , 2000 Biological Conservation, 93 (3):381-391 |
| Movement activated guard (MAG) | Wolf (<i>Canis lupus</i>) Black bear (<i>Ursus americanus</i>) Bald eagles (<i>Haliaeetus leucocephalus</i>) | Wisconsin, Minnesota (USA) | Yes | Sustainable | <ul style="list-style-type: none"> Repels all vertebrate predators The stimulus may warn humans or other approaching predators | <ul style="list-style-type: none"> The duration of the effectiveness is still unknown, needs to be tested for different predator species Expensive device | Shivik <i>et al.</i> , 2003 Conservation Biology 17 (6):1531-1537 |

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|---|--|--------------------------------------|-----------------------|------------------------|--|---|--|---|
| Electronic training collar (EC) | Wolf (<i>Canis lupus</i>) | Minnesota (USA) | No | Short-term | <ul style="list-style-type: none"> Able to target individual wolves | <ul style="list-style-type: none"> Different responses from individuals of the same species Substantial logistical, animal care and maintenance problems | Shivik <i>et al.</i> , 2004 | Conservation Biology 17(6):1531-1538 |
| Ultrasound | Small livestock | New Zealand | Under experimentation | Sustainable | <ul style="list-style-type: none"> Prevents small livestock straying out Inexpensive | <ul style="list-style-type: none"> Not yet known | Hoare, 1992 | Environmental Conservation, 19(2):160-166 |
| Relocation: voluntary human resettlement | Carnivores | Worldwide | Mixed results | Sustainable | <ul style="list-style-type: none"> Leads to a substantial reduction of the conflict Results in recovery of carnivore populations | <ul style="list-style-type: none"> Needs to be truly voluntary Should not face any political, social or cultural opposition Should entail a fair participatory process | Treves and Karanth, 2003b | Conservation Biology 17(6):1491-1500 |
| MANAGEMENT PRACTICES | SPECIES | COUNTRY/REGION | SUCCESSFUL | TYPE | STRENGTHS | WEAKNESSES | SOURCE OF INFORMATION | |
| MITIGATIVE STRATEGIES | | | | | | | | |
| Compensation system (natural resources) | Tiger (<i>Panthera tigris</i>) Leopard (<i>Panthera pardus</i>) and many herbivores* | Rajasthan, India | Yes | Sustainable | <ul style="list-style-type: none"> Compensation is equal to the losses Promotes positive attitudes and responsibility | <ul style="list-style-type: none"> Protected areas are frequently visited by locals Control system needs to be developed | Sekhar, 1998 | Environmental Conservation, 25(2):160-171 |
| Compensation system (financial) | Elephant (<i>Elephas maximus</i>) Tiger (<i>Panthera tigris</i>) | Karnataka, India | No | Short-term | <ul style="list-style-type: none"> Recognises the economic costs of living with wildlife Intends to provide financial support | <ul style="list-style-type: none"> Local authority faces significant financial costs Economic loss exceed the compensation received | Madhusudan, 2003 | Environmental Management, 31(4):466-475 |
| Compensation system (financial) | Snow leopard (<i>Uncia uncia</i>) Tibetan wolf (<i>Canis lupus chanku</i>) | Himachal Pradesh, India | No | Short-term | <ul style="list-style-type: none"> Recognises the economic costs of living with wildlife Intends to provide financial support | <ul style="list-style-type: none"> Local authority faces significant financial costs Economic loss exceed the compensation received | Mishra, 1997 | Environmental Conservation, 24(4):338-343 |
| Compensation system (financial) | Asian lion (<i>Panthera leo persica</i>) Leopard (<i>Panthera pardus</i>) | Gujarat, India | No | Short-term | <ul style="list-style-type: none"> Recognises the economic costs of living with wildlife Intends to provide financial support | <ul style="list-style-type: none"> Compensation covers only 10% of the market value of the cattle | Vijayan and Pati, 2002 | Population and Environment, 23(6):541-559 |
| Compensation system (financial) | African mammals | Kenya | No | Short-term | <ul style="list-style-type: none"> Recognises the economic costs of living with wildlife Intends to provide financial support | <ul style="list-style-type: none"> High administration costs and lack of funds Does not reimburse for crop or livestock losses Fully inadequate to compensate for human injury or death | Hoare, 1992 | Environmental Conservation, 19(2):160-165 |
| Insurance programme | Snow leopard (<i>Uncia uncia</i>) | Himachal Pradesh, India and Mongolia | Yes | Sustainable | <ul style="list-style-type: none"> Small annual investment Refunds cover the entire loss Farmers implement better preventative measures | <ul style="list-style-type: none"> Takes 3-2 years before becoming sustainable Control system need to be developed | Mishra <i>et al.</i> , 2003 | Conservation Biology, 17(6):1512-1520 |
| Incentive programme | Snow leopard (<i>Uncia uncia</i>) | Himachal Pradesh, India and Mongolia | Yes | Sustainable | <ul style="list-style-type: none"> Offsets the cost of wildlife conservation Results in local support and participation | <ul style="list-style-type: none"> Heavily subsidised | Mishra <i>et al.</i> , 2003 | Conservation Biology 17(6):1512-1520 |
| Community based natural resource management scheme (CBNRMS) | African elephant (<i>Loxodonta africana</i>) Lion (<i>Panthera leo</i>) | East Caprivi, Namibia | Under experimentation | Potentially successful | <ul style="list-style-type: none"> Motivates rural communities toward wildlife conservation Results in local support against poaching | <ul style="list-style-type: none"> Wildlife related revenue might not compensate the actual individual financial loss | O'Connell-Rodwell <i>et al.</i> , 2000 | Biological Conservation, 93(3):381-391 |
| Regulated harvest | Carnivores | Worldwide | No | Short-term | <ul style="list-style-type: none"> Can raise public tolerance for dangerous species Low cost technique | <ul style="list-style-type: none"> Needs to be regulated by policy and scientific monitoring Unlikely to reduce the conflict Wounding instead of killing an animal increases the risk of further attacks | Treves and Karanth, 2003b | Conservation Biology, 17(6):1491-1499 |
| Wildlife translocation | Rhesus monkey (<i>Macaca mulatta</i>) | Uttar Pradesh, India | Yes | Sustainable | <ul style="list-style-type: none"> Reduces the density of wild animal populations and thus the conflict Monkeys did not show any signs of stress | <ul style="list-style-type: none"> Dependent on the availability of alternative natural habitat Reliant on the support and tolerance from locals in relocated areas | Imam <i>et al.</i> , 2002 | Oryx, 36(1):87-93 |

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| * Nilgai | (<i>Boselaphus tragocamelus</i>). |
| Sambar | (<i>Cervus unicornis</i>). |
| Chital | (<i>Axis axis</i>). |
| Wild Boar | (<i>Sus scrofa</i>). |
| Common langur | (<i>Presbytis entellus</i>). |
| Rhesus monkey | (<i>Macaca mulatta</i>). |