ment. In fact, the international border with Nepal is not very far from where the *mela* is held, and it is more or less an open border. It seems possible that this ivory is smuggled out of the country along this route and eventually finds its way to the international market, particularly in south-east Asia and beyond. Sawn ivory has always been sold at Sonepur. Owners of tuskers recover some of their cost by selling off the sawn tips of the tusks of their animals when the 'show' is no longer necessary to enhance the price of the animal. One ivory dealer with an advertised presence was selling ivory and it was reported that the asking price was between Indian rupees 3,500 and 5,000 per kilogram. Another party informed one of us when approached incognito that he had a stock of 80 kilograms of ivory to offer to a likely buyer.

Is Sonepur *mela* an anachronism which has to wither away? This writer feels that the traders at Sonepur - most of them local small landowners keeping an elephant or two as symbol of social status during the year and making some profit in the following *mela*, if possible and buying a new one with the proceeds have a positive role to play. They take in small animals and bring them back as grown ups. The cost of maintaining young elephants in government stables is high - around Rs.1,500/- per month, whereas these people can do it practically free, feeding the animals with their farm produce and taking a personal care of the animals which is so sadly lacking in most (but not all) government establishments. This positive side of the much maligned traders at Sonepur needs to be clearly stated.

So much for elephant and ivory trade in Sonepur, 1991.

(For Sonepur mela, see D.K. Lahiri-Choudhury, 'The Indian Elephant in a Changing World', in *Contemporary Indian Tradition*, ed. Carla M. Borden, Washington and London: Smithsonian Institution Press, 1989).

(Note: 1 US$ = c.25 Indian rupees in November, 1991).

IS TRANSLOCATION A MANAGEMENT TOOL?

by : Mohd. Khan bin Momin Khan, Tajudin Abdullah Mustafa Abdul Rahman and B. Mohd. Nor.

PHILOSOPHY, PRINCIPLES AND CONCEPT OF MANAGEMENT

Man-nature interactions started when our food-gathering ancestors *(Homo erectus)* learned to hunt first by using their bare hands to improvise lethal and efficient weapons. Man also observed wildlife to acquire special skills and knowlegde to become a more effective hunter. At the same time our ancestors invented axe and saw to cut the pine and oak forest and make room for their settlements. The food-gathering society subsequently turned into prime consumers and commersialisation took place to support the human populations who were involved in other avocations.

As the *Homo sapiens* population experienced rapid growth and dispersed widely throughout the hemisphere, more resources were utilized by man and wildlife populations were gradually displaced from their natural habitats. Later man became highly mechanised; chain saws to cut the forest, tractors to till the farm and guns to kill the wildlife. Consequently, resources became scarce and wildlife species experienced massive extinction or rendered threatened or endangered.

Since 1600, a total of 194 species of mammals, birds, reptiles and amphibians were extinct and 617 more species are threatened with extinction (Nilson 1983). In such a situation, the purist might take a *laisse-faire* attitude - if the resource is available and the species is destined to be extinct then let nature takes it's course. A strict naturalist, conservationist or environmentalist might take a near-religious approach - if it is good for the wildlife then the whole resources become untouchable. The sport hunter argues that the wildlife must be able to propagate in its natural habitats and the surplus need to be harvested. On the other hand, illegal hunters and poachers are attracted to the wildlife for the high value of the meat, horn or ivory. While commercial exploiter would argue that all resources must be able to serve the market economy to the maximum level without any regard to its future implications. Conversely, a utilitarian might look into the non-consumptive use of wildlife resources such as wildlife use in the tourism industry. Political leaders would exploit natural resources for self benefit or for his/her constituents. However, to a scientist or conservation biologist, resources can be put into productive use or extinction of species could be avoided or delayed by using our scientific knowledge, skill and experience to restore the species to recovery.

Whether we should interfere or not with the natural or unnatural ecological processes is rather a question of morality and ethics. It can either be taken as political, emotional or *practical solutions to real problems*. As a more successful and civilised species in the animal kingdom, are we duty-bound to help other species to coexist and utilise the same resources on this planet? Or do we need the wildlife and the wilderness they live in to be utilized wisely for our well being? It is more ethical to cull and eat wildlife than to kill and eat domestic animals?

If the animals have ancestral rights then why don't the human population be relocated to accommodate the wildlife population utilise the resources.

However, neither the resources nor the wildlife could decide what is good or bad for them. And can the 5 billion human population reach a singular solution on what is good for the resources and the wildlife? Most of the time we find that the decisions made by environmentalists and strict naturalists tend to be out of touch with reality, politics or incompatible with the sovereign rights of a nation and its local culture. Since we live in the real world, we must be pragmatic; sustainable resources development and wildlife existence are both needed by man. According to the founder of modern wildlife management, Aldo Leopold, "There are some who can live without wild things and some who cannot". Therefore, we must compromise on a practical solution to benefit everyone.

From the time the Mongol ruler of Kublai Khan (1216-1294) who was the first known "conservationist" to provide food for migratory birds, men have developed and refined the knowledge and techniques as management tools to enable us to interfere in the processes of the natural communities. Wildlife management involved the science and art, aimed at achieving sound human goals for wildlife resources by working with wildlife populations, habitats and people (Leopold 1933, Giles 1969, Teague and Decker 1979).

The management efforts usually aim at increasing, stabilizing or decreasing of the wildlife populations. It is also generally known that any viable population is a result of adequate quantity and quality of food, cover, water and special requirements of the species. These principles and concepts of wildlife management are vital factors in determining our decisions to implement certain tools to optimise the resource utilization for the benefit of the mankind and animal species.

WHAT IS TRANSLOCATION?

According to IUCN (1987), translocation is the reintroduction, restocking and the introduction of the non-native species. Reintroduction is the intentional movement of an organism into a part of its native range from which it has disappeared or extirpated in historic times as a result of human activities. Restocking is the practice of releasing an organism into a part of its historic range where small numbers of the same species still exist.

Thus tranclocation can occur between wild- to-wild and captivity to wild. Wild animals held captive in the zoos or farm can be a half-way-house for any reintroduction or restocking programmes.

WHY TRANSLOCATE?

Animals are translocated from one area to another for the purpose of saving the population from habitat destruction or its persecution to the brink of extinction, captive propagation, reestablish extirpated populations, augment existing populations, reestablish new population, domestication, economics, as biological control or accidental in nature.

Translocation can contribute to the preservation of the wildlife. Some large mammals have been translocated from the native land and raised in foreign habitats. Pere David's deer, Przewalski's horse and Arabian oryx are classical examples where the wild animals are almost certain to become extinct in their natural ranges. The Arabian oryx raised in Phoenix Zoo and San Diego Zoo were reintroduced into its former range in Oman, Jordan and the rest of Middle East.

The Timor, deer *(Cervus timorensis)* that was translocated to and domesticated in Mauritius has become an important economic resource for the country. The farm-raised Timor deer has been reexported to other countries including Malaysia.

The elephants in Malaysia which were driven from their natural ranges had caused over M$300 million on crop damages since 1969. Before the solution could be remedied, culling seemed the best alternative for short-term management. Soon after translocation techniques were developed which are unique to Malaysia. The translocation of these wild elephants to other habitats helped to solve their depredations on agricultural crops.

TRANSLOCATION AS A MANAGEMENT TOOL

There are more than 416 attempted translocation programmes involving a wide variety of mammals, birds, reptiles and amphibia (Foster-Turley 1990). It is therefore a tool in the wildlife management used widely throughout the world. The success of the populations after translocation is not immediately known. However, according to Tudge (1992) success is rather erratic, with a mere 15 percent in the United States for the birds. The larger mammals can expect a higher degree of successful translocation.

Introduction of alien species has become a major cause of extinction among native species. Nile perch has displaced the native fish in Lake Victoria in Africa and rainbow trout is wiping out native brown trout in British rivers. Rabbits that were introduced into Australia have caused severe damage and are competing with the other wild and domestic animals. The American red-eared slider has invaded the Malaysian rivers and is competing with the local turtle species. The translocation of such species is not desirable at all and it has an economic disadvantage to the receiving countries.

In general, there are five major considerations before embarking on a successful translocation programme (Foster-Turley *et al* 1990, Griffith *et al* 1990);

i. suitable habitat of the release site
ii. release of large number of animals
iii. use of wild-caught rather than captive individuals
iv. adequate and available resources (funding, manpower, technology and time)

v. status of the animal (endangered, threatened and vulnerable)

THE MALAYSIAN EXPERIENCE

I. Elephant *(Elephas maximus)*:

In the face of rapid rural development, wildlife lost a lot of the prime habitats to agricultural plantation. Initially, wild elephants that strayed into the agricultural plantation were driven back into the forest by frightening them using flares and gun shots. After a while these animals got used to the sound and flares and elephant drive was rendered ineffective (Monroe and England 1978). Finally, hundreds of those wild elephants had to be culled and their population were reduced to about 500 individuals. In the mean time, other techniques were developed by DWNP including chemical repellants, trenches, barriers and electric fencing. Electric fencing is found to be effective to control elephants from raiding agricultural crops. However, since the estimated cost is M$1,311 per kilometer (Monroe and England 1978), it may not be economical in areas bordering large tracts of elephant habitats or where the agricultural areas involved belong to smallholders who have limited source of funding.

At the same time, in early 1970s, the DWNP was able to combine the Assamese method of elephant handling and chemical immobilisation to restrain and relocate wild elephants. The new technique was successful in solving the elephant problem in the Jengka FELDA area in the state of Pahang.

In March 1984, a herd of 9 elephants was trapped on an island at Kenyir Dam. The herd which comprised subadult and adult elephants, was translocated to Sungai Buai. Between 1989 and 1991, 38 wild elephants were translocated to Sungai Chenana, which is located about 6 km from the first release site (Hassan Kassim 1992). From the subsequent monitoring work about 75% of the total released elephants were detected and the remaining might have migrated elsewhere (Hassan Kassim 1992).

Between 1990 and 1991, a total of four adult male wild elephants went across a narrow strait from southern part of Johore and landed on Pulau Tekong and Pulau Ubin is Singapore (Abdul Samad 1990, Mohd-Tajuddin *et al* 1992). The animals were captured and translocated to Endau-Rompin State Park in Johore, Malaysia.

Since then about 260 elephants were translocated to Endau-Rompin, Temenggor Dam, Kenyir Dam and Taman Negara. At an estimated average translocation cost of M$15,000 per head, the DWNP had spent almost M$4 million. The costs are partly absorbed by the Federal Government and the plantations where the elephants are causing a lot of problems.

The fact that there is not a report of any carcass found in the release sites is an indication that the translocated animals have survived. Operational mortalities prior to translocation are mainly due to poor body conditions and accidents (eg. animals fell on their trunks).

As a result of protection and translocation of the wild elephant its population now has increased and is estimated to be about 1200 individuals.

II. Sambar deer

In Sungkai Deer Farm a herd of 10 animals escaped in 1986. Due to this accidental release, the deer population had increased and is now causing damage to the young rubber saplings in the nearby plantation.

In Taman Negara, a few pairs of deer were released at Kuala Tahan. Today the sambar deer population around Kuala Tahan is estimated to be about 14 individuals.

MANAGEMENT CONSIDERATIONS

The effectiveness of the translocation as a management tool is based entirely on the continued survival of the populations in the new habitats. Whether translocation is a viable solution or not to wildlife problems depends on the wildland protection. In some cases, translocation programme is thwarted by on-going habitat destruction and maladaptation of the species to the new environment. In certain instance, the cost of the whole exercise of tranclocation might be prohibitive for a poor country and financial help is often sought from a third party interested in nature conservation.

In the long-term, a holistic approach must be taken to ensure that the management decision is viable - translocation should be complemented by habitat preservation/conservation and long-term monitoring to determine the survivability of the population.

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ASIAN ELEPHANT: NATURE'S FOUR - WHEEL DRIVE VEHICLE

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The elephant is the largest terrestrial mammal in Asia. Prior to the large scale modification of its habitat by man, the range of Asian elephant extended from the Euphrates-Tigris river systems in the west through Asia south of Himalayas to Indo-China and most of southern China in the east. Today, the Asian elephant occurs in Bangladesh, Bhutan, Burma (Myanmar), Cambodia, China, India, Indonesia (Kalimantan and Sumatra), Laos, Malaysia (Peninsular Malaysia and Sabah), Nepal, Sri Lanka, Thailand and Vietnam. At the turn of the century, it was estimated that there were more than 100,000 elephants in Asia. But today it is doubtful if the wild populations in all the thirteen countries of the species range would add up to 55,000 animals. Although the elephant's present range still extends from the Indian sub-continent in the west to the rim of the Indo-Chinese peninsula, yet the total wild habitat available for it in Asia amounts to only about 500,000 km2 (or about the size of Thailand), which is declining at an average rate of 4,000 km2 per annum. It is therefore one of the most seriously endangered species of large mammals in the world. Indiscriminate hunting and forest clearance are the principal causes for the decline in number of elephants in Asia.

Prior to about 1900, when agricultural settlement in Sumatra first led to a substantial degree of deforestation, most of the island was covered in primary forest. Presumably up to that time, the elephant was more or less continuously distributed throughout the whole area. The island of Sumatra must have had a subs-