

**AGLS6502 Unit 7 (Extension) Wildlife
Management:
Wildlife Management and
Conservation Strategies**

By

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(i) *THREATS TO THE WILD DUCKS AND ANIMAL WILDLIFE IN GENERAL WITH SPECIFIC REFERENCE TO THE NEO-TROPICS [Caribbean, Central and South America]*

The **Ducks** and most other wildlife in the New World [Neo-Tropics] are being threatened or endangered by the following: Human/ Biotic Factors, Pollution and Micro-Climatic changes.

1] Human/Biotic Factors

As human populations increase so does the need for additional housing settlements. "Towns and suburbs gradually encroach on the natural forests and bush-land areas thereby destroying the natural habitat of the wild animals."¹ The forested areas where these animals make their home have not only been threatened by the clearing of land for the construction of housing, but have also been under threat from the building of motorways and access roads which fragment their natural habitat.

In many small-island states the aim to become self-sufficient in food has led to more land being devoted to agriculture. New areas are being rapidly developed in an attempt to supply these countries with food. Additionally, the removal of timber from the forests and forest fires have created less obstacles for hunters as well as leading to further habitat destruction.

Other major causes for the decline in the number of Collared Peccaries are over-hunting and indiscriminate killing. Some hunters disregard the illegality of hunting in the closed season and kill animals that may be potentially fertile or pregnant. This is compounded by the willingness of members of the society to purchase.

2] Pollution

When the human population disposes of refuse using unsanitary or environmentally hazardous methods, there are negative effects on preservation of all wild animals.

3] Climate Change

Global and regional/ local climate changes, natural and manmade, impinge on the environment and micro-climate of wildlife adversely. Increasing rainfall and rising temperatures impact on both the flora and fauna, thereby negatively affecting food supplies, animals' habitat and possibly their reproductive rates and health.

¹ R. Holmes, "Our Duties to Endangered Species", Conservation and Values. (Colorado: Colorado University Press, 1998) 57.

SUMMARY OF SOLUTIONS FOR THE PRESERVATION AND UTILIZATION OF NEO-TROPICAL WILDLIFE

In an effort to halt the decline of the wildlife population in Latin America and the Caribbean four conservation approaches are reviewed below. The first general approach was suggested by Ojasti (1996), and it has nine (9) broad areas. The second approach is that practiced in French Guyana (Richard-Hansen and Hansen, 2002). The third approach is the generalized practice that is being used in North America. The fourth approach has been suggested by Kissoonsingh and Garcia in Garcia *et al* (2005) for the Small Island States of the Caribbean. Three (3) other global approaches exist but would not be covered in this document. They are approaches used in Australia, Asia and the African Continent. Australia has quite unique animals that are native to that continent and Asia and Africa has large mammals unique to this region. The Neo-tropics [Central, South America and the Caribbean] has the largest diversity of animals [both aquatic and terrestrial] but the largest mammal is the Tapir [*Tapirus terrestris*] and only weighs up to 250 kg. The work done in Australia will be highlighted later in this unit.

A STRATEGY FOR WILDLIFE UTILIZATION IN LATIN AMERICA AND THE CARIBBEAN

Ojasti (1996), working in Venezuela, proposed a strategy for wildlife management for Latin America [wherein lies the Neo-tropics]. This contains the following nine [9] elements:

1. TOTAL PROTECTION
2. PROTECTED AREAS
3. SPORT HUNTING
4. CAPTIVE BREEDING
5. EXTENSIVE MANAGEMENT OF COMMERCIAL SPECIES
6. ENVIRONMENTAL EDUCATION
7. RESEARCH
8. WILDLIFE PROTECTION SERVICES
9. OTHER STRATEGIES.

The full details of this strategy can be downloaded from the FAO website, FAO Conservation Guide #25, FAO Rome.

A STRATEGY FOR WILDLIFE CONSERVATION IN FRENCH GUYANA

French Guyana is a unique neo-tropical location. It occupies an area of 91,000 square kilometers and has a population of 191,309 persons (July 2004 estimate). Hunting is allowed year-round, but animals are categorized into three (3) groups as follows:

- **Animals that are Red listed and cannot be hunted (red animals), these being the Fully Protected Species;**
- **Animals which can be hunted but for personal use only/ not to be traded, Hunting permitted but not for trade** and
- **Animals which can be hunted and traded locally (green animals, totally unprotected),** (Richard-Hansen and Hansen, 2002).

This green list consists of eight (8) species of mammals and they are:

1. Collared Peccary [*Tayassu tajacu*, *Pecari tajacu*]
2. White Lipped Peccary [*Tayassu pecari*]
3. Tapir [*Tapirus terrestris*]
4. Paca [*Agouti paca*]
5. Agouti [*Dasyprocta leporina*]
6. Capybara [*Hydrochaeris hydrochaeris*]
7. Nine-Banded Armadillo [*Dasypus novemcinctus*]
8. Armadillo [*Dasypus kappleri*]

The above species have been reported to account for 73% of all mammalian catch from a study on animal biomass harvested in the Brazilian Amazonia (Peres, 2000).

THE NORTH AMERICAN APPROACH

The approach that is adopted in the USA and Canada is based on the "**The Practice of Wildlife Management**". This is defined as **the science / art of manipulating animal and plant populations, and their habitats, to achieve specific human objectives.**

This approach has five components that are listed as follows:

- Management of Exploited species (**Game** species)
- Management of Overabundant species (**Pest** species)
- Management of Rare and Declining species (**Endangered** species conservation)
- Management of Critical habitats/ecological communities (**Nature Parks and Reserves**)
and
- Financing Wildlife Management.

The focus in this approach is on Management and Law Enforcement. This may be a very simple and useful approach for the North American culture, but it should be remembered that

1] the USA and Canada is one of the World's centres for the production of domestic animals and the feed for these animals and

2] the USA and Canada does not have the quantity and range of animal biodiversity as exists within the Neo-tropics.

A STRATEGY FOR TRINIDAD AND TOBAGO [A SMALL ISLAND STATE]

Kissoonsingh and Garcia as cited by Garcia *et al* (2005) have suggested a Strategy for Trinidad and Tobago [that is a small island state] consisting of the following elements:

1. Enforcement of the existing Land Use Zoning Laws.
2. Enforcement of the Wildlife Conservation Laws with increased penalties.
3. Enactment of new Anti-Pollution laws.
4. Establishment of Wildlife Emergency Relief Centres.
5. Education of the population, and

6. Establishment of Captive Breeding Centres or the Empowering of Farmers to produce wildlife and in particular, the **Ducks** and other desirable wildlife species.

A fuller explanation of these elements follows.

1] Enforcement of the existing Land Use Zoning Laws

There are enacted laws that have prescribed land use in order to preserve the natural habitat of many species of wildlife. These laws have not always been enforced. Unless the situation changes land use zoning will continue to be problematic and not be of any real benefit to conservation.

2] Enforcement of Wildlife Conservation Laws

In some small island states there is incorporated into the wildlife laws protection for all wildlife against hunting. In Trinidad and Tobago the enforcement of these laws is weak, while the monetary rewards after breaking these laws are high and the law enforcers have become customers and consumers of the lawbreakers. The need for higher monetary penalties accompanied by long terms of penal punishment, for both the lawbreakers and guilty law enforcement officers, may deter them from continuing the trade out of season.

3] Enactment of New Anti-Pollution Laws

The enactment of new pollution laws with an emphasis on the proper disposal of industrial waste, is critically needed in many countries. Meaningful penalties, including permanent closure of the offending industry would be introduced to deter the indiscriminate dumping of effluent into water sources. Additionally, the burning of waste that causes air pollution would be included in these laws. However, in the legislative process, there is the human element, which too often is easily compromised.

4] Establishment of Wildlife Emergency Relief Centres

Wildlife emergency relief centres, once developed, can assist in the protection and rehabilitation of wildlife. These centres would be established in populated areas near to forests to allow the retrievers easy access. Their services would include a mobile unit to recover wildlife from homes, disaster areas and young, orphaned by hunters. The rehabilitation centre will act as the repository. This solution is costly and the human element poses the threat of compromise.

5] Education of the Population

Public education with special emphasis on hunters is an existing program. Unfortunately this has had minimum impact on the general trends. Ignorance by the status quo of our Neo-tropical wildlife species and the monetary gains associated with the wildlife trade have rendered the education of commercial hunters invalid. However, the booklets by Brown-Uddenburg *et al* (2004) and Garcia *et al* (2005) and others to come hope to contribute to strengthening of this important effort.

6] Establishment of Captive Breeding Centres/ Empowering Farmers to produce Peccary

The establishment of captive breeding centres where young adults will be housed is the recommendation of choice for several reasons. *This was recommended by Hislop (1989), a long time ago!!!²*

Firstly, this would lend itself to intensive production. Secondly the centres would provide protection and a healthy environment for reproduction. “Predictable reproduction models will allow correct charting and knowledge of the animal’s cycle.”³

The centres could be housed at stations that are already established and associated with the conservation, protection and reproduction of wildlife, such as the Emperor Valley Zoo and the OTF-APL [in Trinidad and Tobago]. The trained staff present will be available to address medical and behavioral concerns. This is the role in conservation that zoos could fulfill. These centres could also act as relief centres for orphaned and traumatized animals, so rehabilitation and restoration of the animals can be handled in a proper manner under secure conditions. This type of facility will ensure that the threat of human compromise is avoided through the existing security measures at the Zoo.

Additionally private persons and farmers could be encouraged to produce and manage the Neo-tropical Animals commercially, thereby decreasing the dependence on the wild populations. The establishment of the first captive breeding centre could be constructed under the umbrella of The OTF-APL and a Zoo. This could become the blueprint for the other centres throughout the country where State institutions exist. These will provide the animals with trained professional health care and security [from attack by hunters through the security mechanisms, already established at the Zoo] comparable to that at the Zoo. This approach would also assist in the integrating of wildlife conservation, management, production, utilization and cuisine. **However, the time is right for the establishment of a Centre for Neo-tropical Animal Wildlife Management, Conservation, Production and Utilization in Trinidad and Tobago. This could be both a “World Centre” and an International Network.**

² Hislop (1997):

³ C.G.C. Rawlins, “Zoos and Conservation: The Last 20 Years.” Advances in Animal Conservation. (London: Zoological Society of London, 1984) 83.

THE PROBLEM WITH REGARD TO NEO-TROPICAL ANIMAL WILDLIFE

The Neo-tropical Animal Wildlife or Terrestrial non-aquatic wildlife of the Caribbean is the group of animals most at risk for reasons of ignorance, little attention being given to them, uncontrolled and unsustainable harvesting and use. In addition there has always been confusion about who is responsible for the terrestrial animal wildlife, sometimes the Forestry Ministry, sometimes the Environmental Ministry, sometimes the Ministry responsible for Fisheries and sometimes the Ministry of Agriculture of the respective Caribbean countries.

The Problematique of Neo-tropical Animal Wildlife

The “Problematique” with respect to Neo-tropical Animal Wildlife essentially revolves around three areas. The first is the contradiction between the Private Sector and Public Sector needs and perspectives. The second is the conflict between the *in situ* and the *ex situ* conservation activists and third problem is our lack of knowledge of our Neo-tropical Animal Wildlife species. These are now further elaborated on below.

1] Private vs Public Sector or Governments

Figure 1 presents a view of the world that reflects two polar extremes, from the perspective of the “Private Sector” and the “Governments or the Public Sector”.

2] In situ vs Ex situ Conservation

In Figure 1 the world is also shown to be divided into two vertical hemispheres, “*In situ Conservation activities*” and “*Ex situ Conservation activities*”. *In situ* refers to conservation within the animals’ natural or undisturbed habitat, *ex situ* refers to animals being conserved or managed artificially outside of their natural habitats, e.g. Zoos and Wildlife Parks and Reserves. **However, all the scientific and social actors are called upon to service both the *in situ* and *ex situ* activities.**

3] Little Awareness, Knowledge and Education regarding our Neo-tropical Animal Wildlife vs Extensive Knowledge of the Domestic Species that have been imported over the last five hundred (500) years

There is little knowledge of the Anatomy, Physiology, Behavior, Nutritional Needs and Husbandry regarding our thirty important Neo-tropical wildlife species. In addition only few scientific studies have been conducted on these species in contrast to the vast scientific literature on the imported [non-neotropical] domestic species of livestock that have been generated by North American, Latin American, Caribbean, European, African, Asian and Australian Universities. In the case of Australia, where there is a vast repository of unique wildlife, research has been conducted through their Departments of Animal Science and Schools of Veterinary Medicine [Anon (1978), Anon (1989), Anon (1990), Anon (1992), Anon (1994a &

b)]. This limited understanding of our Neo-tropical Animal Wildlife is further reflected by the general lack of “un biased awareness” of the existence and role within our ecosystems of these species by the general public. In addition the topics of “Zoos and Wildlife” are not included at present in the School Curriculum, and this topic is only now marginally included in the curriculum of Caribbean and Latin American Universities. What is therefore urgently needed is funding for the basic and applied research on the thirty important Neo-tropical Animal Wildlife species as identified by Ojasti (1996), and the preparation and delivery of the educational material arising for all concerned, in regard to those species of commercial value.

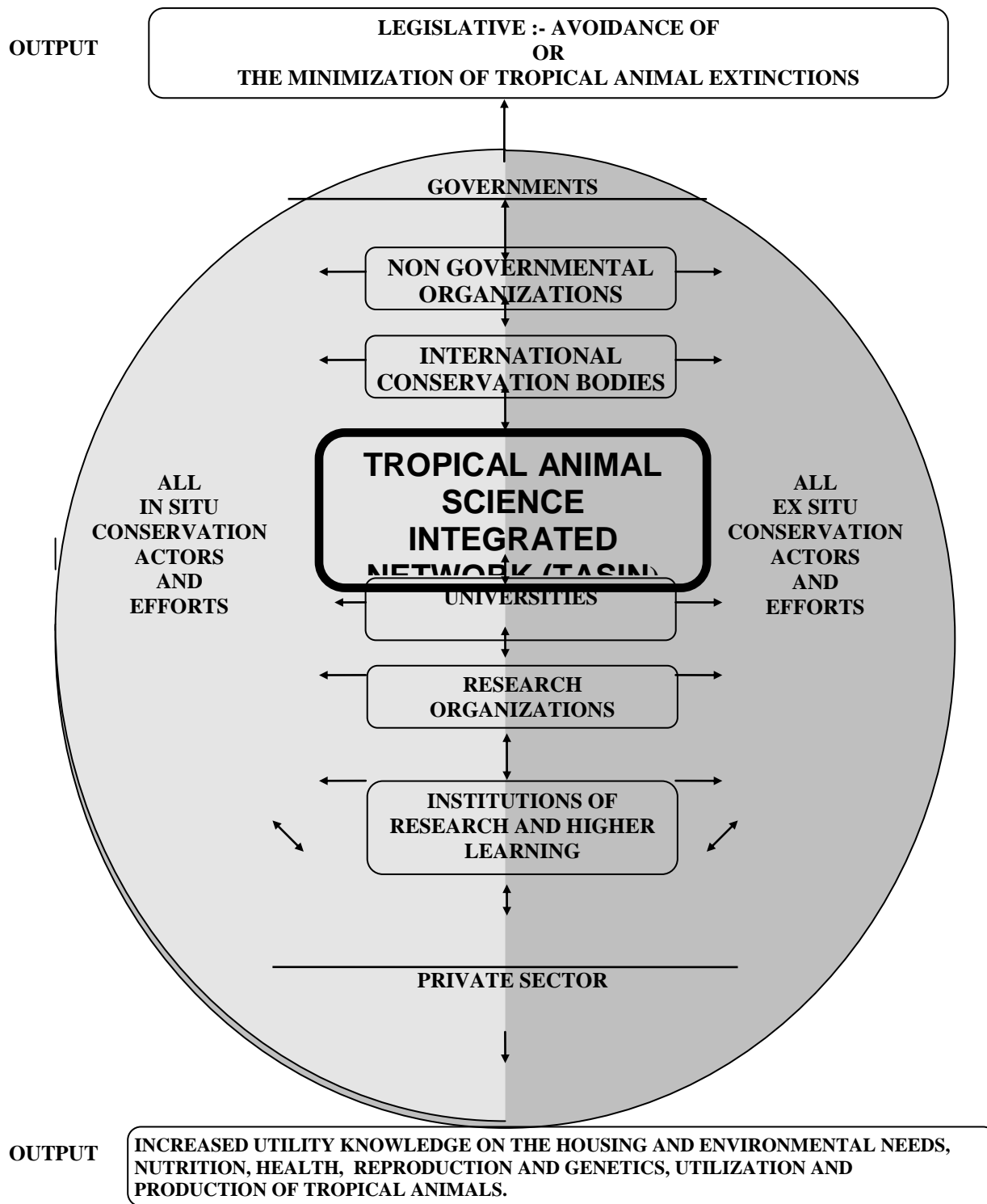


Figure 1: A conceptual framework for The formation of a Tropical Animal Science Integrated Network (TASIN)

THE SOLUTIONS: THE APPROACH OF THE OPEN SCHOOL OF TROPICAL ANIMAL SCIENCE AND PRODUCTION [OSTAS&P]

THE ASSUMPTIONS OF THE OSTAS&P REGARDING NEO-TROPICAL ANIMAL PRODUCTION

The Assumptions are as follows:

- I] the maintenance of Tropical Animal Biodiversity is essential for the well being of humankind on earth;
- II] Tropical Animals have been selected by nature to be adapted to Tropical Environments;
- III] there are five (5) factors governing the production of any species of animals or livestock and they are as follows:
 - 1) Nutritional and Feeding Factors
 - 2) Breeding, Genetics and Reproduction Factors
 - 3) Health and Disease Factors
 - 4) Environmental Factors
 - a) The Physical Environment (Housing)
 - b) The Social Environment (other animals) and
 - 5) The Economic and Marketing Factors; and
- IV] all animal species can be produced using a Systems of Production Modeling Approach [Box 1 and Figure >>>> in Part 4 of this booklet] (Garcia and Archibald, 2001).

THE PHILOSOPHY OF THE OSTAS&P

The elements of the Philosophy are as follows:

- 1] the concept of the intensification of production is necessary whether *in situ* and / *ex situ* conservation is practiced;
- 2] the use of the Systems of Production Modeling Approach has the features as described in Brown-Uddenberg *et al* (2004) and Garcia *et al* (2005);
- 3] Animal Production should be based to the greatest possible extent on the use of the local and available feed resources;
- 4] seek to understand the factors affecting animal production for each species being studied; in the case of new species, first attempt an understanding of the anatomy and functioning of the Digestive and Reproductive Systems;
- 5] “Production Systems” should be intensive in approach and integrated in nature, seek to find complementary animals and plants; and
- 6] “Systems of Production” must encourage plant and animal diversity (Garcia and Archibald, 2001).

THE WAY FORWARD BEYOND THE YEAR 2012: HOW SHOULD PEOPLE WHO SUBSCRIBE TO THE OSTAS&P PROCEED

Intensification for the development of this school of thought:

This concept of intensification involves the bringing together of many animals into a single location, or within close proximity to each other with the problems attendant on increasing animal population densities. This is also an approach being used in South Africa for the Management and Conservation of their animals.

Approaches to Developing Intensive Animal Production Systems:

A philosophical approach that is being suggested for the developing and planning of any system is based on two elements:

- 1] an understanding of **the factors affecting animal production** and
- 2] **the physiological states of the animal species in question.**

What must be noted is that there exists an interaction between the above two; and this interrelationship will determine the nature of the production system. The reason for this is that at each physiological state, the effect of each factor will be different **OR** the needs of and the threats to the animals' survival will be different.

The reality, however, is that the Tropical Animal Scientists, working in the tropical developing countries [wherein are the repositories of the abundant animal genetic material], do not have the resources [financial and otherwise] to be able to accept the challenge. Globalization and its consequent decrease in research support from and for small states, has found them not looking after their own interest in exploiting their biodiversity and protecting their intellectual property rights. This is because these small states are not making the necessary investment in research into and the conservation of their own natural renewable resources. This is also helping to make this unfortunate situation even worse.

THE SUGGESTED APPROACH OF THE OSTAS&P

This new approach should have the following elements:

- (i) an **increased dialogue** between *in situ* and *ex situ* wildlife conservation efforts (the bringing together of ***the different human elements***);
- (ii) the intensive Production of Species with the potential for domestication;
- (iii) the utilization of biotechnology for the conservation of useful genes from within the existing wildlife gene-pool;
- (iv) the expanded Research into the anatomy (**digestive** and **reproductive**), health and husbandry of wildlife species;
- (v) the development of an International Network on Neo-tropical Animal Wildlife [Non-domestic animal] research and development, which would include Zoos, Conservation Parks, Universities, Research Institutions and Private Collections; and

- (vi) the CGIAR International Plant Genetic Resources Institute (IPGRI) Network Model could be used as the basis for setting up the TASIN as suggested in Figure 1 (Garcia and Archibald, 2001) or the establishment of the **Centre for Neo-tropical Animal Wildlife Management, Conservation, Production and Utilization**.

THE RESOLUTION OF THE PROBLEM: TASIN

The resolution being suggested is the initiation of a network called the **Tropical Animal Science Integrated Network [TASIN]** and this is directly linked to the New Horizons [Figure #1] or the **Centre for Neo-tropical Animal Wildlife Management, Conservation, Production and Utilization**.

THE NEW HORIZONS

The complementary activity of the *in situ* and *ex situ* conservation techniques will pose new challenges for **Tropical Animal Science [TAS]**. The major challenges will lie in the intensification of production activities in both the *in situ* and *ex situ* conservation situations. It is for this reason that a **Tropical Animal Science Integrated Network (TASIN)** or the **Centre for Neo-tropical Animal Wildlife Management, Conservation, Production and Utilization** is being suggested. It is envisioned that this network could be funded and function in a manner similar to the International Board for Plant Genetic Resources (IBPGR). The first task of the OSTAS&P therefore would be to get this network going. The nature of the network linkages and the general expected outputs are presented in Figure 1. This would afford a better opportunity for the two conservation camps to interface and have constructive dialogue with all the stakeholders in Tropical Animal Science, [Domestic Livestock (Food, Companion and Laboratory Animals/ animals at different points in the productivity and utility to humanity continuum); Animals on the verge of Domestication; and Wild Animals]. TASIN was first suggested by Garcia (1999).

The future horizons for Tropical Animal Science and Production lies in:

- [1] getting a better understanding of the wide range of under-utilized non domesticated tropical animal resources (Neo-tropical Animals) and
- [2] creating synergisms from the efforts of the 2300 Zoos world-wide [the *ex situ* conservation and research efforts] and the 4000 plus nature reserves worldwide [the *in situ* conservation efforts].

In order for **Tropical Animal Science** to fully blossom, ‘blinkers’ would have to be removed; our Eurocentric approach to Animal Science would have to be changed and **greater dialogue between the *in situ* and *ex situ* approaches to animal conservation, management and production must be engaged**. Blaut (1997) has suggested that this “Eurocentric diffusionism” has contributed to the current lack of success and overall development of tropical agriculture and has contributed to the destruction of small holder agriculture in Puerto Rico and the United States Virgin Islands. One should take note of this and avoid it having a negative effect on the

future of **Tropical Animal Science** that is still in its infancy. Hence those who subscribe to the thinking of the "**The Open School of Tropical Animal Science and Production [OSTAS&P]**" would agree that there is a need to view **TAS** and **Tropical Livestock Development** from a different perspective, if the science is to be advanced. A move possibly from "Dialectical" thinking to "**Trialectical thinking (critical thinking in the light of advancing the humanizing project)**" as has been suggested by [the late Dr Herb Addo in the last paper he wrote] Addo, 1996.

This new horizon first begins with the need for the resolution of the conflicts between the following:

- ✚ **Neo Tropical Wildlife Conservation**
- ✚ **Neo Tropical Wildlife Production**
- ✚ **Neo Tropical Wildlife Utilization and Cuisine.**

This would require the Harmonious Coordination and Collaboration among all stakeholders with a clear unemotional articulation of their respective points of view **and The Synergism of Neo-tropical Wildlife Conservation, Production, Utilization and Cuisine** (Garcia 2004).

NEO-TROPICAL WILDILFE FARMING INITIATIVES

We would now like to highlight for you the global importance of Wildlife. This is simplified in the following short section.

The Value of Wildlife

Chardonnet, des Clers, Fischer, Gerhold, Jori and Lamarque (2002) have categorized the value of wildlife under the following headings:

1] The Economic Importance of Wildlife

- ❖ Non-consumptive uses
- ❖ Consumptive Uses
 - Wildlife Products
 - Products from Live Animals
 - Products from Dead Animals
 - Wildlife Farming
 - Wildlife Hunting
 - Subsistence Hunting
 - Commercial Hunting
 - Sport Hunting
 - Wildlife Husbandry
 - Wildlife Ranching
 - Reindeer Herding
 - Game Ranching

2] The Nutritional value of Wildlife

3] The Ecological Role of Wildlife

4] The Socio-cultural significance.

In the USA in 1996 it was estimated that 35.2 million individuals fished, 14 million individuals hunted, 9.5 million individuals hunted and fished, and 62.9 million individuals participated in at least one type of wildlife viewing activity [Chardonnet et al (2002) citing Anon (1996)]. They also reported that the total expenditure on all wildlife related activities in 1996 was estimated at US\$101 billion. These types of records are not very easily available from within Neo-tropical economies. This therefore makes it difficult for us to argue the case to justify funding for Neo-tropical wildlife research and conservation.

The non-consumptive use of wildlife are associated with viewing wildlife and this generates revenue through money spent on accommodation, transportation, food, equipment and miscellaneous goods used by individuals enjoying wildlife-appreciation activities.

THE REASONS FOR THE CAPTIVE REARING OF ANIMAL WILDLIFE SPECIES

Captive-bred stock will prevent the possible extinction of the indigenous animal wildlife species. In Trinidad and Tobago these animals might include the Agouti (*Dasyprocta leporina*), Lappe (*Agouti paca*), Cocrico (*Ortalis ruficauda*) and the Deer (*Mazama americana*) as these are the species that are some of the most hunted. But in Guyana on the South American mainland these animals are plentiful. On the other islands of the Caribbean other useful species include the Mountain Chicken (*Leptodactylus fallax*) in Dominica; the Jamaican Rock Iguana (*Cyclura collie*) and the Bahamian and Jamaican Hutia (*Geocapromys brownii*) in Jamaica. These latter two are on the world list of endangered species. Wildlife Farming could also ensure that there will be a gene pool in the wild for future work on the improvement of the captive reared wildlife stock. It was concluded that, wildlife farming had a multi-purpose role to play in Trinidad & Tobago and should be encouraged.

The role of wildlife farming

An examination of the literature suggests that wildlife farming has a multipurpose function in society. The roles of wildlife farming can be categorized under the following:-

- 1. production of food and commercial products**
- 2. economic opportunities**
- 3. rural development**
- 4. recreation and aesthetics**
- 5. religious activities**
- 6. biological pest control**
- 7. integrated farming**
- 8. education and**
- 9. conservation benefits.**

THE EVOLUTION OF WILDLIFE FARMING IN THE CARIBBEAN AND FRENCH GUYANA

Hislop (undated), defined wildlife farming as the rearing or keeping of (game) animals for the purpose of captive breeding.

Hislop (1987)⁴ suggested that there appeared to be two categories of wildlife farmers, the hobbyist and the backyard farmer. Dr Carol James reported that captive rearing of wildlife has been practiced in many rural communities in Trinidad & Tobago for several years and has outlined the socio-economic benefits of this (James,1988)⁵. Such rearing was carried out as an underground operation because of the fear of prosecution. An FAO expert in 1986 suggested that there was no legal prohibition against the keeping of game animals in captivity (Asibey, 1986). However, wildlife farmers should not dispose or trade their animals during the closed hunting season (i.e. April 1st to September 30th annually). International conservation and international development organizations have begun to lend support to captive-breeding of wildlife as a basis for food production. These include the **International Union of Nature and Natural Resources**; the **Smithsonian Institution**; and **United Nations Food and Agriculture Organization**. Recently several governments, including that of the Republic of Trinidad & Tobago, have become aware of the importance of wildlife farming as a form of economic activity to be exploited or explored by rural communities. Official sanctioning and encouragement of wildlife farming has led to the discovery of a large pool of active farms. These farms were run mainly as hobby units for recreation and retirement, or as a peasant/ subsistence type operation to supplement incomes. With Dr. Asibey's encouraging initiatives in Trinidad and Tobago co-operation among existing farmers was fostered through the formation in 1984 of the **Wildlife Breeders and Farmers Association of Trinidad and Tobago**. This association provided the ideal avenue for co-operation between the Ministry of Food Production Lands and Marine Resources and wildlife farmers.

Rooplal (2004) surveyed wildlife keepers and farmers in Trinidad and Tobago and from a list of 250 registered wildlife farmers [obtained from the Wildlife Section of the Forestry Division of the Ministry of Public Utilities and the Environment] he reported that 81 were active. Fourteen (14) of them never started farming and sixty four (64) of them stopped farming. The results showed that the majority of farmers were from rural districts and the majority of farmers reared agouti (*Dasyprocta leporina*). The majority of them were also over 50 years of age and had both primary and secondary school education. Most farmers kept these animals for non commercial purposes, but some also kept them for commercial reasons. The majority of them depended on the wild for obtaining animals but some also sourced there animals from captive reared stock. The most important finding was that the wildlife farmers perceived that there were three (3) constraints to the expansion of wildlife production in Trinidad and Tobago and these were:

- 1. Breeding Animals: difficulties in obtaining breeding animals**
- 2. Information: limited technical and production information on the neo-tropical species and**

⁴ Hislop,G. (1987)

⁵ James , C. (1988)

3. No Support: a lack of state support for wildlife production.

At present within the Department of Food Production, Faculty of Food and Agriculture at the UWI, St Augustine there exists the **Open Tropical Forage–Animal Production Laboratory [OTF-APL]** in which attempts are being made to develop animal production models and systems of production for the following non-domestic animal species:

Rodents:	Agouti	<i>(Dasyprocta leporina)</i>
	Capybara	<i>(Hydrochoerus hydrochaeris)</i>
	Lappe	<i>(Agouti paca)</i>
Reptiles:	Iguana	<i>(Iguana iguana)</i>
	Red tailed Boa	<i>(Boa constrictor constrictor)</i>
	Spectacled Caiman	<i>(Caiman crocodilus/ Caiman sclerops)</i>
Amphibians :	Mountain Chicken	<i>(Leptodactylus fallax)</i>
Marsupials:	Opossum/ Manicou	<i>(Didelphis marsupialis insularis)</i>
Ruminant:	Deer	<i>(Mazama americana)</i>
Avian:	Cocrico	<i>(Ortalis ruficauda)</i>
	Scarlet Ibis	<i>(Eudocimus ruber)</i>
	Pawi/ Piping Guam	<i>(Arrubia pipile/P. pipile)</i>
	Wild Ducks	
	Fulvous Whistling Duck	<i>(Dendrocygna bicolor)</i>
	Black Bellied Duck	<i>(Dendrocygna autumnalis)</i>
	White Faced Whistling Duck	<i>(Dendrocygna viduata)</i>
	White-Cheeked Pintail	<i>(Anas bahamensis)</i>
	Wild Moscouvy Duck?	<i>(Anas mouchata/Carina mouchata)</i>
Suiformes:	Collard Peccary or Quenk	<i>(Pecari tajacu, Tayassu tajacu)</i>
Felines:	Ocelot	<i>(Felis pardalis/ Leopardus pardalis)</i>
Armadillos:	Nine banded Armadillo/ Tattoo	<i>(Dasypus novemcinctus)</i>
Anteaters:	Lesser Anteater/ Tamanduas/ Matapel	<i>(Tamanduas tetradactyla)</i>
Sloths:	Poe me one	<i>(Choloepus didactylus)</i>

In Trinidad and Tobago work is also ongoing with aquatic species in the Department of Life Sciences, Faculty of Science and Technology, The School of Veterinary Medicine The UWI, and at The Institute of Marine Affairs. Most Ministries of Agriculture in the Caribbean have a Fisheries Division where information on aquatic species can sometimes be obtained.

THE INITIATIVES WITH NEO-TROPICAL ANIMAL WILDLIFE FARMING OF THE CHAMBRE D'AGRICULTURE DE LA GUYANE [French Guyana]

« Knowledge of the Wildlife of French Guyana: Possibilities for Intensive Production and Domestication »

The Institute Nationale de la Recherche Agronomique [INRA] of the French Republic and la Chambre de l'Agriculture de la Guyane had conducted nutritional and reproductive studies on the Collared Peccary at the Experimental Station at Soucoumou in French Guyana. In addition Judas (1999) and Judas and Henry (1999) had conducted Ecological Studies on the collared peccary in the humid Amazonian forest in French Guyana. These studies spanned the decade of the 1990's. This scientific platform created on the Collared Peccary along with the interest expressed by the farmers precipitated la Chambre de l'Agriculture to request of INRA Antilles-Guyane assistance in developing a production system for the Collared Peccary that could be used by farmers. This led the INRA and la Chambre to the Open Tropical Forage-Animal Production Laboratory [OTF-APL], Department of Food Production, UWI in Trinidad and Tobago and the result was the development of a collaborative project.

This project was divided into two sub-projects, one that took place in French Guiana and the other that occurred in Trinidad and Tobago. There were three main reasons for this initiative and they were as follows:

- 1) there was consumer demand for "wild meat" that was constantly expanding both in French Guyana and Trinidad and Tobago;
- 2) there has been a vision of the need to diversify the existing agricultural farms in French Guyana and
- 3) the agriculture in French Guiana was in the throes of a sustainable development thrust.

These realities have led the Chambre Départementale d'Agriculture de la Guyane to enter into cooperative activities with Trinidad and Tobago and Brazil that seeked to obtain concrete results on producers' farms as well as on the Chambre's Field Station at Soucoumou near to Kourou in French Guyana.

This project's objectives included:

- 1) the placement of experimental peccary production units on selected farms;
- 2) identifying any limiting factors or knowledge that is limiting Peccary production and domestication;
- 3) working alongside the farmers in developing the production systems; and
- 4) working towards the developing of a wildlife production sector.

Expected Out Put Objectives:

- 1] production of a technical-economic booklet on the production system; and
- 2] studying the technical components involved in the setting up and unfolding of this experimental phase.

The following have been the activities to date:

- a) a technician has been made available to the French Guiana project, thanks to the scientific participation and commitment of the OTF-APL, DFP, Faculty of Science and Agriculture of the University of the West Indies, St. Augustine Campus, Trinidad and Tobago;
- b) contact has been established with workers in Brazil via a visit of the Peccary Project Team from French Guyana and UWI to the wildlife research initiatives at the Universidade Estadual do Santa Cruz, Brazil;
- c) information exchanges has been productive to the point where the French Guiana part of the project is physically putting in place the 2nd phase of its semi-extensive production system of collared peccaries with its project farmers and
- d) a Ph.D. Thesis has been submitted by Gail Young on this experience (Young 2012).

The project was also expected to expand into the Agouti (*Dasyprocta leporina*), the Green Iguana (*Iguana iguana*) and the Capybara (*Hydrochoerus hydrochaeris*). The contents of Garcia et al (2005) were therefore an important contribution to this effort. It demonstrated the multi-national, multi-lingual, multi-cultural, multi-institutional and multidisciplinary nature of this effort.



Figure 2: Soucoumou Experimental Station



Figure 3:
Integrated Aquaculture, Atipa or Cascadura (*Haplosternum littorale*) and Muscovy Duck Production at Soucoumou Experimental Station

THE WORK OF INRA WITH NEO-TROPICAL WILDLIFE

Work by INRA on the collared peccary and the white lipped peccary involved the captive rearing of these animals in the middle 1990's at the research station at Soucoumou near Kourou (where the European Union Space Station is located) in French Guyana. The focus of the work was aimed at getting a better understanding of the digestion of fibre and concentrate feeds by these two Peccary species. Scientists who had expertise with pig nutrition from the "Station de Recherches Porcines, INRA, St. Gilles" and "Institut Technique du Porc, Le Rheu", France conducted these trials. They found that the Peccaries digested the fibre very well and that the digestive system of these animals functioned more like that of ruminants than mono-gastrics or pigs. A very important feature of this work was the development of restraining cages and metabolism equipment modified from pig experimentation apparatus. The recommendation from this work was that there was the need for further physiological or biochemical data on the digestive capacity of the pancreas, the small and large intestine and the gut microflora. INRA again became involved with working on Neo-tropical Wildlife when in 2000 they were asked for scientific assistance by "La Chambre de la Agriculture de la Guyane" for guidance in developing production models for the Collared Peccary and other Neo-tropical animal species. INRA then engaged the collaboration of the Open Tropical Forage Animal Production Laboratory (OTF-APL) of the University of the West Indies for collaborative support in this area. Garcia et al (2005) with the multinational authorship was the result of INRA's Centre Antilles-Guyane's critical intervention.

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