

Sustainable Use of *Caiman crocodilus* in Caño Negro, Costa Rica

July 2003

D. King¹; M. Esquivel²; K. Hausrath³

¹*School of Natural Resources and Environment, University of Florida
Gainesville, Florida 32611 U.S.A.*

²*Facultad de Derecho, Universidad de Costa Rica
San Jose, Costa Rica*

³*Chicago-Kent College of Law, Illinois Institute of Technology
Chicago, Illinois U.S.A.*

*Faculty Advisor: Dr. Richard Hamann
Levin College of Law, University of Florida
Center for Governmental Responsibility
Gainesville, FL 32611 U.S.A.*

*In Cooperation with Ignacio Escorriola
Asociacion Ambiental Vida
San Jose, Costa Rica*

Sustainable Use of *Caiman crocodilus* in Caño Negro, Costa Rica

Introduction

Caño Negro National Wildlife Refuge is located in northern Costa Rica near the Nicaraguan border in the province of Alajuela. The reserve consists of 9,969 hectares of wetland. During the dry season, the lake which is fed by the Rio Frio and its tributaries separates into many small lagoons¹. Caño Negro was established as a wildlife reserve in 1984, and in 1991 it was designated as a Ramsar Wetland of International Importance². It contributes to the ecological stability of the region and provides a home for over 230 migratory bird species², endangered species, and species of commercial importance¹. Threats to the area include increasing sedimentation and erosion, pollution from agriculture and human waste, deforestation and fires.



One of the many species of birds found in Cano Negro³

The community of Caño Negro has a relatively small population and limited infrastructure. Major economic activities include seasonal subsistence farming, permanent cultivation, cattle ranching and seasonal non-commercial fishing. In addition, tourism operations provide some employment⁴.



The gar fish is one of species that is both important for tourism and a food source for community members.

It has been suggested that Caño Negro's caiman population is a potential additional source of revenue for the community. *Caiman crocodilus*, or the common caiman, is a protected species which can be utilized for its meat and skin. Recent population surveys have indicated that the caiman population in Caño Negro may be sufficient to support the harvest of this natural resource. The purpose of this paper is to explore the possibility of establishing a sustainable use program for caimans in Caño Negro, Costa Rica.

Caiman crocodilus

Crocodiles are keystone species, contributing to the maintenance of ecosystem structure and function. Most require large and diverse habitats. However the caiman is one of the few crocodylian species which can persist in small areas of disturbed habitat⁵. Its characteristics as a generalist and an adaptive predator contribute to its ecological success. Females become sexually mature between four and seven years of age (at approximately 1.2 m), depending on the population and an individual's social status. Mean clutch size is approximately 22 eggs which are laid during the wet season in nests which are sometimes shared by more than one female. Hatchlings emerge after 90 days and soon begin establishing social hierarchies⁶.



Caiman crocodilus

The caiman is the most common crocodylian species. In most areas worldwide, populations of caimans are in good condition despite threats from hunting, pet trade, and habitat destruction⁶. This, along with their high reproductive rates⁵ and relatively small size at sexual maturity⁶, can make caimans appealing candidates for a sustainable use program.

Sustainable Use of Caimans

The common caiman supplies the majority of the hide market in America⁶. In Caño Negro, preliminary surveys conducted by night spotting two consecutive nights a month have indicated that the caiman population, believed to be the largest documented in the world at 4000 individuals in 1998, may be reaching the ecosystem's carrying

capacity. If this is true, a sustainable use program could provide a means to utilize this resource whose growth would otherwise be checked by natural ecosystem controls. In addition, sustainable use programs are appealing because they can provide the incentive needed to protect a population or ecosystem.

According to Crocodylian Specialist Group (CSG), there is enough information known about the biology of the common caiman to make an informed decision regarding a population's status. While locally depleted in some areas, the caiman is ranked as a low risk crocodylian species of least concern on the IUCN Red List. The CSG also ranks *Caiman crocodilus* in the highest category for potential for sustainable management⁷.



Caiman crocodilus

There are three types of sustainable use programs for crocodiles⁸. The first is captive breeding (farming) where a stock is kept and maintained for the production of hatchlings. The second filial generation can then be traded. While this may not place direct pressures on the wild population, it also does not create an incentive to preserve the

wild population and its habitat since production is independent of conservation. Costs for this mode of production are generally high, including upkeep of both the stock population and hatchlings. The second is ranching, where eggs, hatchlings or juveniles are collected from the wild. Takings of eggs or hatchlings, when mortality rates are highest, are believed to have a lesser impact on the overall population. An advantage to this approach is that monitoring can easily be integrated into the harvesting process by counting of nests⁹. The third method is the direct hunting of adults. This method usually involves the greatest number of participants benefiting more individuals¹⁰ and yielding larger skins when proper minimum harvest size regulations are enforced⁹.

There are many financial and logistical issues which must be addressed before beginning a crocodile captive breeding or ranching program¹¹. Selection of the location must take into consideration the availability of water as well as its storage, quality and clarity and the disposal of waste. Costs of food, climate control and building requirements should also be carefully calculated and recognized realistically. Research into optimum management methods specific to the proposed program should also be conducted.

Challenges to a Successful Sustainable Use Program

Caimans can be used for meat or hide. They are among the lowest quality of crocodile hides due to their boney osteoderms in the ventral scales which complicate tanning and produce a discolored finished product. Therefore, only the flanks, legs and

tail sections are used in leather production⁵. Salted, unprocessed caiman hides usually sell for around \$US 25 each. Farming projects in small communities such as Caño Negro usually fail because at least half a million skins need to be traded annually to avoid market share problems⁹. Fluctuating prices in the 1990s caused many caiman farming projects, which face competition from other exotic skin products such as ostrich, to close¹².

A requirement which may be specifically problematic for Caño Negro to fulfill is the need for adequate monitoring and enforcement. Illegal hunting is a current problem in Caño Negro. Although poaching is blamed on Nicaraguans who have historical ties to the consumptive use of caiman, it is suspected that members of the Caño Negro community also participate in illegal taking practices. In order for a sustainable use program to succeed, the Management Authority and Scientific Authority (appointed by the government in compliance with CITES) must be able to monitor the direct and indirect ecological effects of the program and control hunting through standardized methods of take, hunting seasons, permitting, tagging and an effective enforcement program¹⁰.

Finally, funding for startup capital and subsequent upkeep and monitoring can be quite cumbersome. A stable funding base is key to any caiman harvest program, regardless of its structure. Potential funding sources include diversions from other programs (an unlikely possibility for Caño Negro as most Costa Rican programs suffer from lack of appropriate funding and personnel), international aid organizations, the leather industry, license and tagging fees and export taxes¹⁰. Adequate funding for start up costs alone usually takes years to secure¹².

There are many documented examples of caiman harvesting projects in developing countries which may help to illustrate potential successes and downfalls for a future project. One such study⁵ reviewing a Venezuelan management program found that they were able to maintain a harvest program within sustainable limits. However, caiman skin prices have fluctuated drastically in response to market demand, and the majority of the profits went to the tanners. In addition, researchers found that the value of caiman harvest was approximately \$US 0.89 per hectare. In comparison, the value of cattle ranching in the same area is up to 26 times greater. This study also found no evidence to suggest that sustainable use programs for caimans promote habitat conservation, as caiman populations benefit from ecologically destructive activities such as cattle ranching. For example, during the dry season, artificial watering holes provide a refuge for caimans.

When considering a sustainable use program, one must recognize that there will be effects not only on the caiman population but also on other species and ecosystem functions⁷. For example caimans have been shown to play an important role in nutrient cycling and the support of fish populations⁶, therefore potential ecosystem repercussions should be explored.

Legal Issues

Although all hunting is prohibited in the refuge, caiman farming under a sustainable use program is allowed in Costa Rica both under national and international

law¹³. International trade of caimans and their products is regulated by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)¹⁴. The Costa Rican caiman population is listed as an Appendix II under CITES. Appendix II species are those “not necessarily now threatened with extinction but that may become so unless trade is closely controlled.” International trade in these species is authorized with the issuance of an export permit from the exporting country’s CITES authority¹⁴.

For Appendix II species to be traded, CITES also regulates tagging of permitted specimens to control quotas and illegal trade. For these reasons, all skins exported also bear a tag with a unique number⁸.

For a caiman harvesting program to be established in Caño Negro, a management proposal has to be approved by the Costa Rican CITES authority within the Ministry of Energy and the Environment¹³ and an export permit issued⁸. This proposal must include a current survey of the caiman population, a management plan for monitoring and regulation, and perhaps most important, Caño Negro must demonstrate an ability to enforce these regulations⁹.

Discussion

The benefits of a successful harvesting program in Caño Negro could be tremendous. If stable, the caiman program could provide much needed funding and job opportunities. It could also be incorporated into the region’s ecotourism draw and help

feed other sectors of Caño Negro's economy. A portion of the profits could be directed back into a conservation fund for Caño Negro and regulations could help control current illegal hunting activities.

Unfortunately, the degree to which these benefits may be realized is highly variable. The number of jobs created and people who would directly benefit would depend on the method of harvest utilized and the type of farm created. For example, Caño Negro's current turtle farm has only 16 permitted participants. Control of illegal and permitted hunting would depend on the effectiveness of regulation and monitoring, both of which have a history of being under-funded and inefficient in Costa Rica. A final uncertainty is whether the population of *Caiman crocodilus*, and Caño Negro National Wildlife Refuge as a whole, would obtain any benefits from this sustainable use program.

Should Caño Negro decide to proceed in the effort to establish a caiman program, the next step would be to obtain a biological survey and begin developing a management strategy and proposal for submittal to CITES authorities.

However the question remains, even if caiman populations are at the level estimated and a harvesting program is biologically viable, would it be economically and socially feasible? Because of the relatively low value of their hide and the large quantity of individuals required to produce a profitable amount of hide, caiman farming programs may not be financially sustainable over a long term⁶. Also, consumption of caiman meat is not a part of Costa Rican culture as it is in other countries, and some Costa Ricans and residents of Caño Negro do not support the idea of harvesting caimans. Instead, they point to other options for expanding into new markets and increasing

economic options for the local community, such as using fish scales which are usually discarded for artwork or export. There is also ongoing research into the possibility of improving and expanding the turtle farming program in order to take better advantage of existing tourism and reassess its ecological and economic impacts on the region. Finally, a promising proposal is being drafted to initiate a joint caiman utilization plan between Costa Rica and Nicaragua. These, and other alternatives, should be explored along with the prospect of a caiman program when considering Caño Negro's economic and environmental goals. While a caiman farming project has the potential to provide a means of sustainable development for the community of Caño Negro, without the proper funding and regulatory controls it could be a threat to the caiman population and an economic misstep.

Acknowledgments

Special thanks to advisors R. Hamann, T. Ankersen and I. Escorriolas. We would also like to thank J. Ross of the CSG for his technical expertise and advice, Director of Caño Negro Refuge A. Delgado, M. Protti of Universidad Nacional, J. Gamboa and J. Sanchez of SINAC, VIDA and the community of Caño Negro for their support.

Endnotes

¹National Parks of Costa Rica Official Homepage. March 1998

Available: <http://www.intnet.co.cr/costarica/parks/negro.html>

²Ramsar Official Homepage. 1992

Ramsar Sites Database

Available: http://www.wetlands.org/RDB/Ramsar_Dir/CostaRica/cr002D02.htm

³ All photographs are original productions of R. Hamann and D. King. July 18, 2003.

⁴Worcester Polytechnic Institute. 2002

Research Station Development and Community Participation in Cano Negro.

Interactive Qualifying Project Report.

⁵Thorbjarnarson, J. & Velasco, A. 1999

Economic Incentives for Management of Venezuelan Caiman. *Conservation*

Biology **13** (2), 397-406

⁶Florida Museum of Natural History Official Homepage.

Species Descriptions: Caiman crocodilus

Available: <http://www.flmhn.ufl.edu/natsci/herpetology/act-plan/ccroc.htm>

⁷ Ross, J.P. (ed.). 1998.

Crocodiles. Status Survey and Conservation Action Plan [Online].

2nd Edition. IUCN/SSC Crocodile Specialist Group. IUCN, Gland,

Switzerland and Cambridge, UK. viii + 167 pp.

Available: <http://www.flmnh.ufl.edu/natsci/herpetology/act-plan/plan1998a.htm>

6 July 1998

⁸ Crocodile Specialist Group.

Introduction to Farming. IUCN/SSC Crocodile Specialist Group.

⁹ Ross, J.P. Crocodile Specialist Group. Personal Correspondence. June, 2003.

¹⁰ David, D. 1994

Harvesting Wild Crocodilians: Guidelines for Developing a Sustainable Use

Program. *Proceedings of the 12th Working Meeting of the Crocodile Specialist*

Group.

¹¹ Pooley, T. (1990)

Basic Crocodile Farming/Ranching Methods in Remote Areas. The World

Conservation Union. *Proceedings of the 10th Working Meeting of the Crocodile*

Specialist Group. **2** 123-165.

¹²Thorbjarnarson, J. 1999

Crocodile Tears and Skins: International Trade, Economic Constraints and Limits to the Sustainable Use of Crocodiles. *Conservation Biology* **13** (3) 465-470.

¹³Gamboa, J. MINAE. Personal Interview. July, 2003.

¹⁴CITES Official Homepage. May 2003

Publications of Official Documents

Available: <http://www.cites.org/eng/append/index.html>