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Multiple species production systems:
Reversing Underdevelopment and Nonsustainability in Latin America

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ABSTRACT: Latin America (LA) is suffering the environmental consequences of worldwide increased productivity and agricultural expansion, as well as strong economic restrictions. To survive, LA landowners m5st turn to higher income products and/or improve productivity. Alternatives are few. But while intensification relies on unaffordable subsidies, diversification is solely dependant on improved management of available resources. Diversified, multiple-species production systems (MSPS) add wildlife use to traditional production systems, promoting economic and ecological stability. We present examples of MSPS in Latin America. Although results are technically encouraging, two aspects threaten their future sustainability: i) local sub-valuation of wildlife, and ii) restricted international markets.

KEYWORDS: Multiple-species production systems, sustainability, Latin America, wildlife use

INTRODUCTION

During the last century, humans have increased productivity per unit area world-wide, and agriculture has significantly expanded. This change has been at the expense of biodiversity and ecological stability, the addition of energy subsidies, important nutrient losses, and high levels of contamination. Latin America has followed the same trend, but in contrast to more developed countries, it has also suffered from external debt and unfavorable terms of trade and protectionism. Thus, environmental degradation and poverty become both cause and effect, in a dreadful cycle.

To counteract this situation, Latin American landowners are forced to turn to higher income products and/or increase production scale. However, intensification relies on input technologies that result in further ecosystem degradation and economic, agrochemical, and climatic dependence. An alternative is to increase productivity by means of "processes technologies," based on system management and diversification of production using natural resources. Diversified production systems or "multiple-species production systems" (MSPS) include the combined use of grasslands, livestock, wildlife, fisheries and forests[1]. Productive activities may be consumptive (ie. commercialization of products) or non-consumptive (ie. tourism). Considering the biodiversity richness upon which they depend and the broad range of goods and services they can provide, these systems promote economic and ecological stability, two qualities that make them models for sustainable use on private lands[2]. Further development of these systems should prioritize analysis of dietary overlap and disease transmission between species included in the model.

In Latin America, some MSPS have become well established: caiman and capybara in Venezuela, vicuña in Peru, green iguanas in Panama, and peccaries in Brazil, to mention just a few[3]. Eco-tourism is also growing, and several ranchers are offering tourist services for wildlife watching.

Multiple Species Production Systems: examples in Argentina

The main eco-regions in Argentina are currently under heavy productivity pressure. MSPS alternatives are discussed for the Pampas, Patagonia and the Chaco.

In the Pampas grasslands, areas with low agricultural potential are used for cattle production based on native vegetation and pastures. In this environment, wild rhea or American ostrich *(Rhea americana*) appear as potential alternatives to increase productivity. Their feathers and skins have been historically commercialized in local and foreign markets and their meat could soon be added. Rhea are unable to jump over cattle fences and become tame with appropriate handling. Their diet is comple-mentary to that of cattle (overlap near 50–60%), which further encourages rhea and cattle combined grazing systems. Nutria (*Myocastor coypus*) and vizcacha (*Lagostomus maximus*) are other native species included in pampas MSPS.

The Patagonia Steppe is an arid and semiarid plain, covered by shrubs and grasses. It has been severely eroded by large numbers of sheep introduced in the late 19th century for wool and meat production. Guanaco *(Lama guanico*e) are native camelids traditionally regarded by landowners as a source of disease and food competition with sheep. However, as a result of high prices for their wool (U$100/kg), considered similar to vicuña wool, they are beginning to be considered as resources. Experimental, semi-captive breeding programs based on wild captured newborns, which are tamed by continuous human contact and supplemental feeding, are being implemented for the use of this species. Traditional sheep fencing has to be modified, adding significantly to start-up costs. Darwin's rhea (*Pterocnemia pennata*) is also managed for MSPS in Patagonia.

The Chaco is a vast plain extending over Bolivia, Paraguay, Brazil, and Argenti-na, which is covered by grasslands, tropical dry forests, and extensive wetlands. It is home for the two caiman species found in Argentina, *Caiman yacare* and *C. latirostri*s. Caiman "ranching" is ongoing at five farms in Argentina based on the harvest of wild caiman nests and the captive-breeding of juveniles. Considering the current low demand for their skins (which has fallen from 10 to one million in the last 50 years) and poor international prices, initial infrastructure costs appear as limiting factors for this alternative. MSPS in the Chaco also include the use of tegu lizards (*Tupinambis sp*.) and the capybara (*Hydrochaerus hidrochaeris)* with good results.

A different MSPS for the Chaco, is based on the harvest of Blue-fronted Amazon parrots *(Amazona aestiv*a) for the "pet" market. A recently established governmental MSPS includes the creation of protected areas with funds collected from parrot sales, education against systematic destruction of nest-trees and harvest control. This project actively involves local aboriginal communities, whose income has increased ten-fold by eliminating middlemen in the parrot commercialization process.

DISCUSSION

Many Latin Americans are descendants of European immigrants, who have

adopted cattle, pork, and poultry as dietary protein sources. Inherited European farming practices did not consider the use of native species as alternatives to livestock production. Instead, wildlife has been historically perceived as a problem for animal farming and agriculture. These cultural concepts lead to a general disregard for wildlife as valuable and useful resources, low demand for their products, and lack of active con-servation initiatives. For the rest of the world, the perception of wildlife has changed significantly in the last century: they have been hunted for food, considered defenseless against human environmental impact, assigned "animal rights," and recently regarded as valuable "resources" that can and must be used for the survival of humanity. This diversity of concepts has affected wildlife-product markets and still divides modern consumer society. Thus, it is urgent to build public awareness about the ecological importance and productive aspects of wildlife[4].

In addition, most wildlife use initiatives are based on intensive and semi-intensive management. While these might be efficient in terms of productivity, they do not respond to basic sustainability concepts: a) they have limited impact on habitat conservation, b) they disregard intrinsic species advantages and depend on external input, and c) they increase the risk of disease problems. Health concerns in MSPS must also be addressed. Systems which combine wildlife use with traditional livestock would benefit from the selection of zoologically distant species to reduce disease transmission risks.

To sustain international and local market prices and consequent high profitability, wildlife production must be managed. However, this is easier said than done. A careful balance between quantities, qualities, prices, and demand for the natural goods produced is needed to ensure the sustainability and conservation of resources.

CONCLUSION

MSPS represent excellent options to traditional animal production systems. Nevertheless, the combination of restricted foreign markets and low local demand for non-traditional products hinders their development. As a result, when production is increased to compensate for low profits, a new fall in prices occurs. Development of sustainable alternatives can only succeed if higher prices compensate for lower productivity. To meet this objective, a radical change must take place in world policies for food production. We need to work towards the creation of a new "consumer" profile that assigns a higher inherent (and thus economic) value to nature. Latin America can still provide high quality goods from untouched environments, generating additional revenue from its natural beauties, or from organic products. Based on our natural riches we can still change our trademark from "underdeveloped" to "sustainably developed."

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