Foreword

In *The Savage Mind*, Claude Lévi-Strauss contrasts nature ('the diversity of species') and culture ('the diversity of functions'), and their symmetry involves 'the assimilation of natural species on the cultural plane'. Much of that assimilation involves the hunting of wild animals. Hunting can be seen as mediating the relationship between nature and culture, both in traditional and in modern cultures, and it is not surprising that the topic of hunting attracts both attention and passion.

This book is about 'how' people hunt, but assumptions about 'why' we hunt influence the arguments about how to manage the way we hunt. For some people, hunting symbolizes the inhumanity of humans to the natural world. Hunting results in defaunation and the loss of biodiversity, and it should be controlled. For others, hunting defines the relationship of people with their environment. Perhaps especially in the case of Indigenous and pre-industrial cultures, hunting seeks to establish an equilibrium, pushing back against the wilderness, assimilating nature and defining culture. In this case, hunting almost defines who we are. For some people, hunting can be seen as a necessity, allowing people to use wildlife resources for their sustenance and betterment. For still others, hunting is a right, and the wildlife species are theirs to harvest: hunting defines the self-sufficiency of rural populations. For these people, hunting should be protected and respected. Of course, hunting can be any or all of the above, but each informs different approaches to the way hunting could be managed in today's world.

It is this challenge to understand how to manage hunting that Julia E. Fa, Stephan M. Funk and Robert Nasi take on in this volume. The focus is on meat hunting for human consumption, which links the argument back into our prehistory and indeed to the very definition of what it means to be human. Raymond Dart in his descriptions of *Australopithecus africanus* in the 1920s argued that these hominids, some 3 million years ago, were hunters, and though the argument has gone back and forth, hunting and humanity were forever joined. Today, while few groups depend exclusively on wild meat, it remains a major source of protein and income to some 154 million households across Central and South America, sub-Saharan Africa, China, Southeast Asia and Indochina. Rural consumption of wild meat is an important part of household food and nutritional security. The trade is a source of rural income and feeds consumption in towns and cities.

The reason for worrying about how to manage hunting is that many species in many parts of the world are overexploited, leading to local extirpation and even extinction. A lot has changed through the course of human history. There are many more of us, and Julia Fa and her colleagues, focusing on the tropics and subtropics, exploring how population density, plus changes in hunting technology and group mobility, have influenced hunting pressure. In the transition to agriculture and urbanization, human diets have shifted onto farmed foods, but that has had concomitant effects on the extent of natural ecosystems and their resident wild species. In the remaining areas, hunting can be intense.

Hunting for food has been blamed for declines and loss of wild populations. Going back into prehistory, the extinction of large-bodied mammals and birds in the late Pleistocene was correlated with the arrival of humans in different parts of the world: to some, *prima facie* evidence of the impact of hunting. The higher extinction rates today as compared to background are blamed in part on hunting. Many studies have tracked the effect of hunting on wild populations: Numbers go down, the demographics of mortality and fecundity shift, population structure changes and populations can be extirpated or cease to function ecologically. Defaunation, a generalized loss of large-bodied animals in otherwise intact ecosystems, is a phenomenon of many hunted areas often described as ‘the empty forest’.

On the other hand, wild meat is a vital resource for millions of people around the world. Especially in forested parts of the tropics, many rural people have little access to other sources of animal protein. In previous work, Julia Fa documented the staggering dependence of people on meat from wild species in the tropics. In the Congo basin, for example, the harvest of wild meat exceeds 2 million metric tonnes a year, equivalent to tens of millions of individual animals. Rural consumption of wild meat is an important part of household food and nutritional security, as well as providing an indispensable income stream for the rural poor as much of the meat is sold in town and city markets.

It is this tension between a limited and dwindling supply of wild populations and the constant demand for wild meat that provided the imperative to understand when and where hunting is sustainable. The twists and turns of the narrative around sustainability are explored in thoughtful detail by Julia Fa and her colleagues. Some of the original work in the field of hunting sustainability was done by anthropologists working with hunter-gatherer societies. The very existence over the long term of such societies that hunted for their food, and the integrity of the faunal communities where they lived, seemed to provide an argument that their hunting was sustainable. Cultural constraints such as food or hunting taboos seemed to provide the mechanisms for such societies to act to avoid overhunting. The phrase 'ecologically noble savage', coined by Kent Redford, raised the question of whether that was indeed the case, or whether the apparent long-term equilibrium of these traditional societies was an epiphenomenon resulting from a human population not involved in a market economy, living in the forest at low densities and able to move when wildlife resources were depleted. In an elegant set of studies, anthropologists examined the question by asking whether these traditional hunters were 'optimal foragers' – pragmatically harvesting the most from the forest that they could, as opposed to being 'natural conservationists' or 'prudent predators'. The answer was unequivocally that they were the former.

This understanding shifted the whole inquiry to one of seeking the ecological, social and economic conditions that promoted hunting sustainability. This volume provides a wonderfully complete examination of these questions. How does the production of meat from wild species vary with rainfall and primary productivity? How does harvest shift as wildlife populations are diminished? Does hunting technology, from traditional to modern firearms, influence harvest rates? How does poverty and proximity to wild areas influence the decision on where and how to hunt? How do hunters decide what to consume and what to sell? What influences markets for wild meat in urban settings?

Central to this endeavour was the need to measure sustainability, and this volume reviews the ebb and flow of arguments on sustainability metrics. The fundamental question is what is the balance between production and harvest. The challenge is always the paucity of information on characteristics of hunters and especially hunted populations. As metrics improved, the argument shifted from 'assessing' sustainability to 'achieving' it. Robert Nasi and his colleagues have led much of this transitional thinking, and the story of these efforts is compelling. Achieving sustainability increasingly sought to ensure that use of wild species was both equitable and ecologically sustainable, while respecting the rights of people depending on the resource.

Achieving sustainability of hunting thus often required devolving the authority and responsibility to local communities, strengthening wildlife management and governance while restricting the access of outsiders. At the same time, efforts to promulgate national laws and regulations governing the sale of wild meat were developed (though often not enforced). Without both stronger management and an appropriate legal framework, the increased commercialization of wild meat for urban markets might create a demand which could swamp out the sustenance and economic needs of rural people, and ravage the biodiversity on which they depend.

There is of course another reason to manage hunting and the trade of wild meat for human consumption. COVID-19 has emphasized the importance of newly emerging zoonotic diseases to the human condition. Julia Fa and her colleagues build a case that establishes how hunters and the wildlife trade are primary contributors to the emergence of zoonotic diseases. The transmission of such diseases is brought about by the direct contact of people and animals, and of recent zoonoses, the great majority originate in wildlife. In tropical ecosystems, especially when fragmented and degraded, hunters are often the first to make that contact, and they are vectors for viral spillovers that result. The wildlife trade disperses wild meat into increasingly larger and more urban markets where viral transmission to other species and to humans is enhanced.

COVID-19 and other zoonoses provide a new challenge to our uncertain relationship with nature, and Julia Fa and her co-authors thoughtfully navigate what this means for the management of hunting and trade. They note that calls for blanket bans on the sale and consumption of wild meat would penalize the rural people who depend on the trade for entrance into the cash economy. Perhaps enforcing existing laws, and halting the sale of wild species for human consumption in urban markets catering to cosmopolitan elites would be more efficacious. But what is clear throughout this book is that hunting defines how we relate to nature, and we are still learning how nature will respond.

John G. Robinson, PhD
Joan L. Tweedy Chair in Conservation Strategy
Wildlife Conservation Society
New York, USA