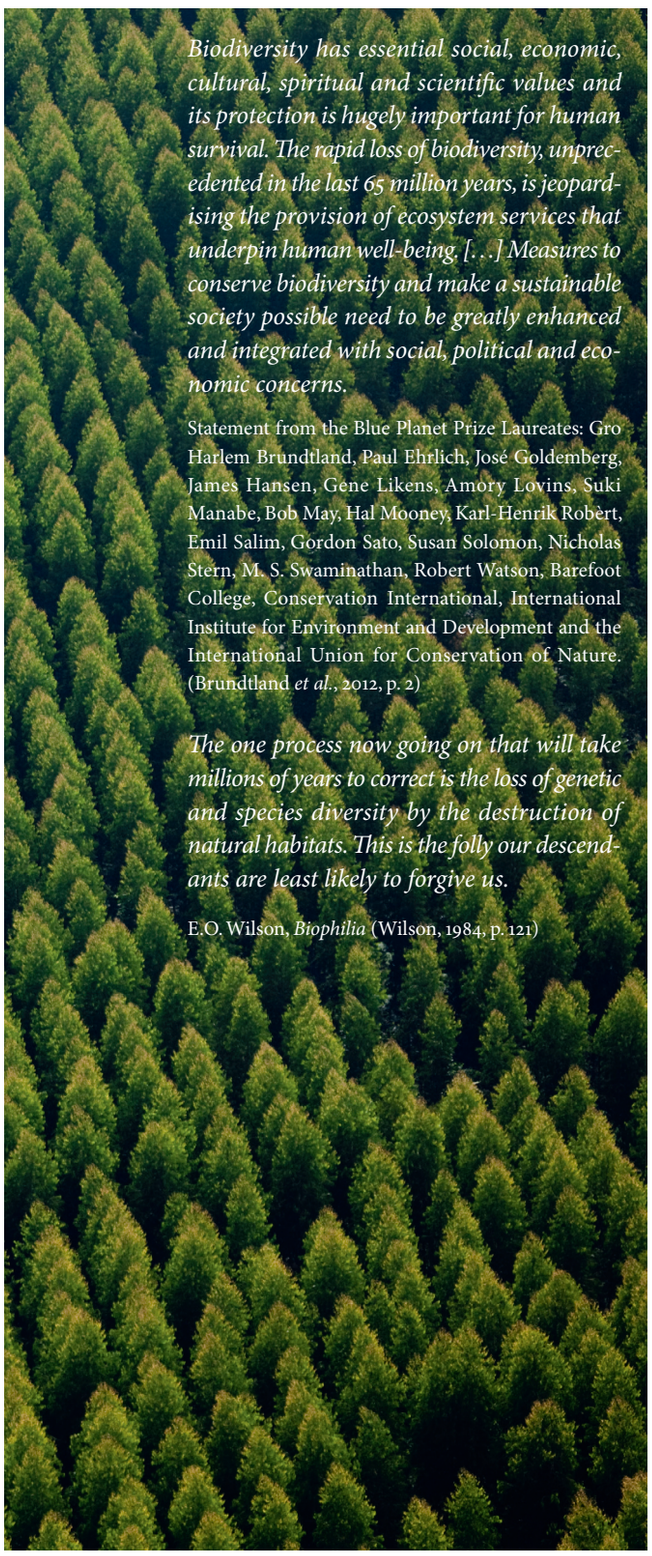

Biodiversity has essential social, economic, cultural, spiritual and scientific values and its protection is hugely important for human survival. The rapid loss of biodiversity, unprecedented in the last 65 million years, is jeopardising the provision of ecosystem services that underpin human well-being. [. . .] Measures to conserve biodiversity and make a sustainable society possible need to be greatly enhanced and integrated with social, political and economic concerns.

Statement from the Blue Planet Prize Laureates: Gro Harlem Brundtland, Paul Ehrlich, José Goldemberg, James Hansen, Gene Likens, Amory Lovins, Suki Manabe, Bob May, Hal Mooney, Karl-Henrik Robèrt, Emil Salim, Gordon Sato, Susan Solomon, Nicholas Stern, M. S. Swaminathan, Robert Watson, Barefoot College, Conservation International, International Institute for Environment and Development and the International Union for Conservation of Nature. (Brundtland *et al.*, 2012, p. 2)

The one process now going on that will take millions of years to correct is the loss of genetic and species diversity by the destruction of natural habitats. This is the folly our descendants are least likely to forgive us.

E.O. Wilson, *Biophilia* (Wilson, 1984, p. 121)

INTRODUCTION

Section 1: Industrial Agriculture and Ape Conservation

Social and economic systems worldwide are changing rapidly, accompanied by an increasing global demand for natural resources, including land, water, minerals, energy sources, food and timber. In areas where the climate, conflict, human population growth, and human population movements are affecting availability, these changes are tied to a scarcity of natural resources. The impacts of many of these social and economic transformations—many of which are propelled by the forces of globalization—are reflected in changes in the climate; the availability and quantity of water, toxicity and eutrophication of waterways; food scarcity in many areas of the world; a loss of biodiversity; and declining terrestrial and marine ecosystems. Finding the tools to both understand and address the complexity of these interrelated trends, and to implement strategies to balance environmental needs with social and economic requirements, is the foremost challenge facing us today. The *State of the Apes* series is an effort to contribute to this search by providing accurate information on the current situation, identifying viable solutions, and presenting apes as a flagship species

Photo: Measures to conserve biodiversity and make a sustainable society possible need to be greatly enhanced. © HUTAN - Kinabatangan Orang-utan Conservation Project

that can contribute to the conservation of tropical forest ecosystems worldwide.

Commissioned by the Arcus Foundation and published biennially, *State of the Apes* has a twofold objective: to raise awareness about the status of apes around the world and to present detailed information on the impacts of human activities on apes and ape habitats. Accordingly, the publication comprises two sections. The first of these, the thematic section, focuses on a different key theme in each edition; it presents original research and rigorous analysis of the current situation and highlights selected best practice, with a view to stimulating debate, informing policy and practice, and promoting efforts to integrate economic and social development with conservation of wilderness and wildlife. Section 2 consists of two chapters that consider the status and welfare of apes, in their natural habitat and in captivity. By using apes as an example, the publication also aims to underscore the importance of species conservation.

State of the Apes covers all non-human ape species, namely bonobos, chimpanzees, gibbons, gorillas and orangutans, as well as their habitats. Ape ranges cover countries throughout the tropical belt of Africa and South and Southeast Asia. For details on each ape species, including their ecology and geographic range, see the Apes Overview (page x). Robust statistics on the status and welfare of apes are derived from the A.P.E.S. Portal (Ape Populations, Environments and Surveys) (IUCN SSC, n.d.), with abundance estimates of the different ape taxa presented in the Abundance Annex, available on the *State of the Apes* website at www.stateoftheapes.com.

Apes are vulnerable to many threats posed to their habitats by humans. Many of these threats are linked to the human use of their habitats, as well as more direct interactions, such as hunting and capture. Since apes are closely related to humans, they are vulnerable to many of the same diseases and stresses. As forests are opened by human encroachment, the proximity between apes and humans is increasing, as is the incidence of direct contact with each other. To promote an understanding of both the impact and extent of these changes with respect to land use, this edition brings together the expertise and experiences of leading scholars and practitioners from various sectors, including civil society, industry and academia, with the ultimate aim of identifying possibilities and potential for avoidance and mitigation of harm.

The first edition of *State of the Apes* presents research, analysis, case studies and

BOX I.1

Industrial Agriculture: Definitions and Usage

State of the Apes defines the term "industrial agriculture" as a method of intensive crop production that is characterized by large monoculture farms and plantations that rely heavily on chemicals, pesticides, herbicides, fertilizers, intensive water use, and large-scale transport, storage and distribution infrastructure. While this edition uses the term "industrial agriculture," it is also referred to as industrial farming, intensive agriculture or farming, plantation agriculture, large-scale agriculture and commercial farming.

Monocultures are a key feature of industrial agriculture; they are part of a strategy to achieve economies of scale and reduce production costs. The term "concession" refers to a relatively large area of land that is allocated to agricultural investors for the industrialized production of crops, generally by a government.

Even though smallholder farmers are known to have significant impacts on tropical forests, including ape habitats (Etiendem *et al.*, 2013), it is beyond the scope of this publication to consider all agricultural sectors. For this reason, this volume only covers smallholder farmers who are part of a system that relies on an industry partner to provide inputs or purchase the commodity, thereby contributing to an expansive monoculture landscape. In these relationships, the farmers are also known as "outgrowers."

On the same basis, this edition considers only the interface of ape conservation and crop production, including agroforestry and tree crops, even though industrial agriculture may also refer to the industrialized production of livestock, poultry and fish. Key commodities such as cocoa, coffee, palm oil, paper and pulp, rubber, sugarcane and tea, produced as a result of large-scale production, are included.

best practice from a range of key stakeholders relating to the interface between ape conservation and the extractive industries. This second edition does the same in relation to the interface between conservation and industrial agriculture (see Box I.1). It examines relevant factors such as the drivers behind agricultural expansion and land investments, governance and the legal framework at this interface, and voluntary standards and certification. By aiming to take an objective approach to the subject matter, this volume is designed to contribute to improvements in current conservation practice and to inform and influence stakeholders, policy and practice in sectors as diverse as commerce (agribusiness, manufacturing and retail), law (legislative protections, industry regulation), civil society and human development—not least by showing how these communities interrelate and affect the status and welfare of apes, and of people. At the policy level, this volume aims to introduce ape conservation into local, national, regional and international policy dialogues; industry policy and practice; and development and economic planning.

This introductory chapter provides a brief overview of the context in which industrial agriculture operates and the broader linkages to ape conservation globally. The specifics of this interaction are more fully explored in the six thematic chapters, which are summarized below.

Industrial Agriculture and Apes

Based on the projected growth of the human population, and anticipated development of global demand for agricultural products, it is estimated that global agricultural production will have to increase by an estimated 60% from 2005 to 2050 to meet the anticipated global demand for agricultural products, such as food and biofuels (Alexandratos and Bruinsma, 2012, p. 7). An estimated additional 700,000 km² (70 million ha) of land will be needed to meet this demand. Since production is expected to decline in developed countries, however, developing countries will be required to make available a projected 1.32 million km² (132 million ha) of land, primarily in sub-Saharan Africa and Latin America (Alexandratos and Bruinsma, 2012, p. 11).

The Institute of Economic Affairs highlights efficient, large-scale industrial agriculture as a solution to these demands (Boyfield, 2013). In stark contrast, the G20 Inter-Agency Working Group on food security points to evidence that large-scale land acquisitions in developing countries to create "megafarms" are the type of investment least likely to generate significant net benefits to host countries and local communities in terms of agricultural development (IAWG, 2011). The Working Group suggests that smallholder farming based on contract farming, outgrower schemes and joint ventures with farmer groups is more conducive to sustainable economic development. The introduction of genetically modified organisms (GMOs) into agricultural production has enormous potential to influence the dynamics of the industry. Although of significant importance in many parts of the world, GMO use remains relatively rare in ape range states across both Africa and Southeast Asia and is therefore not considered in this volume.

The tropical ecosystems in sub-Saharan Africa and Latin America are the primary extensive areas of land left with potential for the development of industrial agriculture (Laurance, Sayer and Cassman, 2014b). The expansion and development of the agricultural estate would not only have obvious implications for forested habitats and wildlife populations, but also significant indirect impacts on humans, not least through the release of greenhouse gases and consequent acceleration of climate change. While Chapter 1 and other sections in this volume touch on the risks and impacts of climate change, this important issue will be addressed in much greater depth in a future edition of *State of the Apes*.

For agriculture to be sustainable and able to meet the demand for food and other commodities, it needs to be considered in the context of a rapidly changing world. It is critical to understand how factors such as urbanization, growing inequalities and divisions between the poor and the wealthy, human migration, climate change, water shortages and floods, environmental degradation, globalization and changing dietary preferences are influencing agricultural production and practice around the world. As this volume demonstrates, industrial agriculture is a major cause of encroachment into tropical forests. Documented effects of forest degradation and clearance on wildlife, including great apes and gibbons, illustrate the impact industrial agriculture can have on biodiversity. The ramifications include local and global food insecurity and pressures on productive capacity as well as entire ecosystems. The complex political, social and economic decision-making that drives the expansion of industrial agriculture needs to consider the environmental factors that underpin the industry, and the diversity of species that is required for ecosystem health. In this context, apes can serve as an indicator species for biodiversity in general.

A significant proportion of tropical forest in South and Southeast Asia has already been converted to serve the needs of large-scale agricultural production systems. In drawing attention to the consequences of this expansion for apes and their habitats, this edition seeks to inform the trajectory of industrial agriculture in Africa, where cultivation rates are relatively low but predicted to increase dramatically in the foreseeable future. Palm oil—used for food, cosmetics, toiletries and biofuels—is the fastest-growing monoculture in the world (Gerber, 2011; FAO, 2014a) and will likely account for a considerable portion of that expansion. Since 42% of Africa's great ape population inhabit areas suitable for oil palm development, and since only a small proportion of that land is protected, the expansion of this crop is certain to have a serious impact on apes (Wich *et al.*, 2014). As reflected in this volume, more research has been carried out on the production of palm oil than on any other commodity. Due to its expansive industrial production, palm oil is the commodity that has had the greatest impact on ape habitats in Asia and that poses the most significant threat to those in Africa. This edition also assesses the impacts of a number of other crops on ape conservation and welfare, including acacia, cacao, rubber, sugarcane and tobacco, thereby speaking to any industrial-scale agricultural production undertaken in ape habitats.

Chapter Highlights

The first six chapters of this edition of *State of the Apes* focus on the various aspects of

Photo: Palm oil—used for food, cosmetics, toiletries and biofuels—is the fastest-growing monoculture in the world.
© Wilmar International

Photo: Tobacco growing on recently cleared forest land in Bulindi, Uganda. © Matthew McLennan

the interface of industrial agriculture and ape conservation. Chapter 1 provides a broad overview of the direct and indirect impacts of industrial agriculture on apes and ape habitat. Chapter 2 discusses the overlap between industrial agriculture and ape conservation and considers contexts within which this interface has developed. Chapter 3 focuses on Africa, the continent whose apes have been least affected by industrial agriculture. Given that this situation is expected to shift significantly in the coming decades, the chapter lays out an in-depth analysis of the context and drivers of agricultural expansion—and of their predicted interaction with apes. Chapter 4 presents an analysis of the legislative frameworks at the interface of industrial agriculture and ape conservation across a number of ape range states and discusses the relevance of engagement with legal instruments to influence the relationship between the two sectors. A discussion of the establishment and evolution of a key voluntary standard, the Roundtable on Sustainable Palm Oil (RSPO), and an assessment of its impact on ape conservation form the basis of Chapter 5. This voluntary standard resonates markedly with ape conservation due to the extensive impact of palm oil production on ape habitats, especially in the Asian context. Chapter 6 puts forward the current understanding of ape ecology in relation to impacts of industrial agriculture. While formal research at this interface remains limited, particularly in relation to African great apes and Asian gibbons, the chapter offers insight based on research in ape socioecology and observations from expert primatologists.

Section 2 is made up of two chapters that focus on broader conservation issues for apes across Africa and Asia (Chapter 7) and for those in captivity (Chapter 8). The chapter highlights are included in the introduction to Section 2 (see page 194).

Section 1: The Interface of Industrial Agriculture and Ape Conservation

Chapter 1: Direct and Indirect Impacts of Industrial Agriculture

As the human population grows and the associated demand for land for cultivation of both food and non-food commodities increases, particularly in the tropics, agriculture will inevitably have an impact on apes and their habitats and affect their chances for survival. The impacts will be felt not only through the clearing of land for large-scale plantations, but also through increasing contact between ape populations that are squeezed into ever-shrinking patches of forest, as well as between apes and humans, as they compete for space

and for food. The mounting frequency of interactions between humans and apes will inevitably lead to the killing and capture of increasing numbers of apes. This chapter explores the direct and indirect impacts of industrial agriculture, evaluating the relevance of industrial agriculture—and palm oil in particular—for poverty reduction and land tenure. It also discusses the interface between industrial agriculture and climate change and—via two case studies, one from Kalimantan, Indonesia, and the other from Bulindi, Uganda—reveals how the development of industrial agriculture affects apes as a result of increased exposure to people and human activity. The final section reviews factors that could motivate the agricultural industry to engage in ape conservation and mitigation strategies—and the means for such engagement.

Chapter 2: Extent of Overlap

This chapter explores the extent to which industrial agriculture overlaps with ape habitats. Through the use of a number of data sets, including the Land Matrix and the Global Forest Watch online platform, several patterns emerge. Comparisons show that in Asia, where a significant amount of land has been allocated to industrial agricultural use, the impact on ape habitats is far greater than in Africa; they also reveal regional differences within Africa, with industrial agriculture concessions seemingly concentrated in West Africa. Other issues, such as agricultural concessions overlapping with protected areas, point to inadequate planning and governance with respect to land use and allocation.

Three case studies—Cameroon, Liberia and on the island of Borneo—explore the evolution of deforestation due to industrial agriculture. A common finding is that industrial agriculture was first established under colonial administrations; yet while significant deforestation linked to industrial agriculture continued across Borneo for decades after the end of colonial rule, this course was not pursued in the other locations, largely due to differing political contexts, including a lengthy civil war in Liberia. In response to a recent resurgence of interest in developing the agricultural sector, however, the allocation of concessions has been on the rise in both Cameroon and Liberia. In Liberia, a recent agreement with Norway for results-based development aid holds some promise for ensuring that decision-making on agricultural expansion takes into consideration areas of significant biodiversity, including ape habitats, and local communities.

Chapter 3: Cause of Conversion—Focus on Africa

The forests of the Congo Basin and West Africa present some of the largest areas

suitable for the expansion of industrial agriculture and are also home to important populations of great apes. Agriculture already represents a significant part of sub-Saharan Africa's economy; however, a shift in the composition of this sector—essentially from one dominated by smallholders to one that is increasingly industrial in nature—is likely to have significant implications for the continent's forests and ape habitats. This chapter presents details on the drivers of this shift, including information on the geographic variation and extent of crops that land investments have targeted. Oilseed crops, including oil palm, castor, sesame and sunflower, have attracted the most commercial interest, with oil palm being the second-largest crop in terms of total land area purchased for cultivation. The recent increase in the number of large-scale land acquisitions in Africa has been accompanied by impacts on apes and tropical forest. While the expansion continues to be driven by the increase in the global demand for commodities—as well as by relatively easy access to land and low set-up costs in Africa compared to elsewhere—the development of the industry has been affected by the Ebola outbreak in West Africa and the global decline in palm oil prices. Despite the challenges, investor interest is likely to persist, especially as domestic and regional demand is predicted to increase and current production is not adequately supplying those markets. What remains to be seen is whether African states pursue the Asian model of clear felling large tracts of land to convert to agriculture or look to Brazil for examples of agricultural development that has championed smallholders, an approach that holds greater promise for protecting ape habitats.

Chapter 4: Legal Frameworks

Engaging with legislative frameworks can help to shape how the interface between industrial agriculture and ape conservation is perceived and managed. This chapter focuses on the national legal systems across eight ape range states—Cambodia, Cameroon, the Democratic Republic of Congo, Gabon, Indonesia, Liberia, Malaysia and Myanmar—all of which also have significant agribusinesses. In exploring the extent to which legislation interfaces with ape conservation, it reviews agribusiness tenure arrangements and highlights conflict with conservation, such as requirements that companies make productive use of all land within their concessions despite possible contravention of environmental considerations. The chapter also assesses the process by which agribusiness concessions are allocated, pointing to institutional complexities and power dynamics that influence decisions. It then discusses the role and extent of provisions for environmental protections, such as the Environmental Impact Assessment, and the degree of transparency and monitoring of compliance with legislation on species protection, which is often hindered in the face of competing agribusiness interests. Unsurprisingly, institutional capacity and political economy considerations are at the root of poor environmental protection, a state of affairs that is unlikely to improve in the absence of robust mechanisms to sanction governments. Yet as the chapter's case study demonstrates, legal mechanisms have been used to uphold the enforcement of environmental laws: in Sumatra, such mechanisms proved successful in blocking the attempted encroachment of agribusiness into the Tripa peat swamp forests, which would have resulted in the destruction of ape habitat.

Chapter 5: The RSPO

Voluntary standards and certification have emerged as a dominant avenue for integrating sustainability into commodity production. They have been developed in response to weak or ineffective state regulation and seek

to address concerns, primarily driven by consumers, in relation to the social and environmental impacts of commodity production. This chapter assesses a key voluntary standard, the Roundtable on Sustainable Palm Oil, which focuses on promoting the sustainable production of palm oil in the tropics. It presents details on three interrelated issues. First, it considers the RSPO's background and its evolution into a functioning institution that is essentially driven by process, highlighting the tension between the standard's objective to transform the global palm oil market and the resultant need to hold its members accountable. Second, it reviews the challenges facing the RSPO as it aims to ensure adherence to robust environmental and social principles. Specifically, it looks into membership influence on decision-making and the consequences of a lack of scientific clarity on interpretation and on the definition of what exactly should constitute certified sustainably produced palm oil. Third, the chapter analyzes the RSPO's focus on the largest palm oil producers, an approach that presents both an opportunity and a challenge. On the one hand, recent commitments by companies that supply more than 90% of the palm oil industry to "no deforestation, no peatland and no exploitation" policies could significantly enhance the RSPO's impact. On the other hand, poor engagement and inclusion of smallholders and other stakeholders—such as local communities and governments at the regional, national and local levels—may ultimately undermine the recent strides that have been made.

Chapter 6: Ecological Impacts

There are significant gaps in our understanding of the impact of industrial agriculture on ape ecology. To enable a more robust analysis of this issue, this chapter reviews formally published materials and gray literature; it also includes the findings from a survey conducted by members of the International Union for Conservation of Nature, the Species Survival Commission, and the Primate Specialist Group's Sections on Great Apes and Small Apes.

Photo: Orangutan foraging in an oil palm plantation. © HUTAN - Kinabatangan Orang-utan Conservation Project

Forest clearance and degradation for the development of industrial agriculture have a direct impact on ape populations through habitat destruction and fragmentation, which may lead to stress, increased morbidity and death among apes. By facilitating access to previously remote areas and thereby promoting commercial hunting, including that of apes, industrial agricultural development also has an indirect impact on ape populations. Further, forest clearance can coincide with significant influxes of people

into an area, prompting further clearance across the landscape and potentially exposing apes to disease. Of all the apes, gibbons are probably most affected by industrial agriculture, due to their territorial and strictly arboreal nature. While the great apes are likely to fare somewhat better—partly thanks to their ability to enter agro-industrial landscapes to forage, sleep or disperse—they cannot survive in plantations alone and need forest and natural habitat for long-term survival. The ongoing fragmentation of ape populations and the use of ape habitats for industrial agriculture is likely to result in long-term population decline and possible local extinction of species. Changing this course will require specific research on how this industry is affecting apes and their habitats, combined with the implementation of land use planning that incorporates essential ecological functions.

Conclusion

By bringing to the fore the myriad issues associated with both ape conservation and industrial agriculture, this edition of *State of the Apes* takes a first step in identifying perspectives on the interface between large-scale agricultural production systems and biodiversity conservation. A considerable force in economic development, industrial agriculture interfaces with ape conservation in ways that represent a fundamental challenge for natural resource management more broadly.

It is clear that pressure on tropical ecosystems to supply global markets will be enormous. The principal frontiers for the future development of key global agricultural commodities are in Africa and Latin America—which are home to the largest tropical forests that have been identified as "suitable" for agricultural development. In Africa and Southeast Asia, this expansion will have significant impacts on the remaining ape habitats; some ape species risk losing their last remaining pockets of habitat. In presenting an overview of the extent of the impact and interaction between apes and industrial agriculture, this edition provides details on how these interactions are manifested, not only in relation to apes, but also in relation to the development of the industry.

A key finding that resonates throughout this edition is the critical significance of effective land use planning—at the relevant landscape-level scale. By incorporating economic, social and environmental considerations, land use plans can help to ensure equitable and sustainable management of land and resources, in part by identifying key areas to be protected and by securing appropriate corridors to connect forests that are protected and managed in a sustainable manner. Given that land use planning is rarely carried out effectively in any part of the world, the promotion of its application is among the most urgent priorities for the conservation of apes—and of biodiversity in general.

Finally, this edition of *State of the Apes* underscores the lessons learned from the rapid expansion of industrial agriculture in Asia, which, if acknowledged, suggest ways to ensure a more sustainable trajectory of industrial agriculture development in Africa. In this sense, this volume is a timely resource—one that can inform a more responsible approach to future agricultural development and conservation in Africa and influence further agricultural development in Asia. In all affected contexts, better engagement among all stakeholders, including smallholders and local communities, is imperative if shifts in the impacts of industrial agriculture on the natural world are to be achieved.

Acknowledgments

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