# Economics 144
# Economics of Conservation
# Summer Session II, 2016

**Course Hours**: MTWTh 3:30 – 4:50 PM **Classroom**: CENTR 212

**Instructor**: Dale Squires dsquires@ucsd.edu
**Office Hours**: Immediately preceding or after class or by appointment

**TA:** Kevin Ray kdray@ucsd.edu
**Office**:
**Office Hours**: TBD

**Course Dates**: Monday, August 1 – Saturday, September 3
**Midterm**: After Section 3
**Midterm Review Sessions**: 2-3 days before the midterm
**Final**: Thursday, September 1
**Final Exam Review Sessions**: Sunday, August 28 (Econ 200) & Tuesday August 30 (Econ 200)

**Some Important Dates for Students***:*
Change Grade Option Deadline: August 12
Drop Course without "W" Deadline: August 12
Drop Course with "W" Deadline: August 30
Last Day to File an Incomplete: September 6

**Purpose:**

Biodiversity and ecosystems and their services face growing threats. Their loss affects human welfare. Humans depend on natural systems to produce a wide variety of ecosystem goods and services, ranging from direct use of certain species for food or medicines to ecosystem functions that provide water purification, nutrient retention, or climate regulation. Sustaining biodiversity and ecosystems in the face of increasing human populations and increased human economic activity promises to be a major challenge. Since most of the threats to biodiversity and ecosystems originate from human actions, understanding human behavior and the social, political and economic systems in which people operate is an essential component for those interested in conserving biodiversity and ecosystems. Conservation biology, ecology, or economics alone are insufficient to address their growing threats.

This course examines conservation policy from an economic perspective, applying economics principles to develop policy, but drawing upon conservation biology and ecology. Major themes include: biodiversity and ecosystems and their services have economic value; both market and non-market benefits and costs should be evaluated and balanced; there are trade-offs and opportunity

costs to conservation; policies should be crafted utilizing both social norms and economic incentives.

The focus is upon conservation of biodiversity and ecosystems and their services through policies that orient social norms and economic incentives to align individual and group behavior with the social-ecological optimum. Special attention will be given to conservation of endangered species. Climate change, an important driver of changes in biodiversity and ecosystems and their services, is covered in Economics of the Environment, Economics 131, and hence not covered here.

Students interested in related political science issues should consider Political Science 125: Communities and the Environment.

**Readings Availability**

- All readings are available in pdf files from the class Blackboard (Ted) website.
- Basic economic theory is in your textbooks from microeconomics classes, although I will lecture on it, and the core readings present the concepts.
- Many of the sections below start with conceptual readings and the last reading or two is an example. I do not test on examples (empirical studies), but you should read (skim) to better understand the concepts and see how they work in the real world.

**Core Readings**

Selected chapters from Swanson, T.M. and E. Barbier, editors. 1992. *Economics for the Wilds: Wildlife, Diversity, and Development*. Island Press, Washington, D.C.

- Barbier, E. Chapter 2, Economics for the Wilds. (Covers total economic value, costs and benefits, discounting, fundamental reasons for market failure / economically inefficient resource allocation (insufficient conservation) – due to inability of resource users to capture the full economic value over their opportunity cost, importance of incentives)
- Alyward, B. Chapter 3, Appropriating the Value of Wildlife and Wildlands. (Covers pure and impure public goods and three resources considered public goods – species and habitat existence, ecosystem services, and genetic resources – how public good nature of resources leads to external benefits and insufficient incentives to provide public goods (i.e. conserve) since don't capture full benefits, non-market external benefits and free riders, dispersion of benefits but concentration of conservation costs on resource users, private and communal resource users and incentives for conservation.)

- Swanson, T. Chapter 4. The Role of Wildlife Utilization and Other Policies in Biodiversity Conservation. (Discusses global public goods and transboundary issues, international collective action, conservation funding, property rights, wildlife trade regulation.)
- Barbier, E. Chapter 5. Community-Based Development in Africa. (Introduction to indirect incentive approach to conservation through community conservation and integrated development and conservation projects plus discussion of poster child CAMPFIRE program.)
- Barnes, Burgess, and Pearce. Chapter 6. Wildlife Tourism.

Bulte, E., G. van Kooten, and T. Swanson. 2003. Economic Incentives and Wildlife Conservation. Paper presented to Workshop on Economic Incentives and Trade Policy. Geneva, Switzerland: CITES. (Discusses most of the major economic concepts developed in this class.)

Arriagada, R. and C. Perrings. 2011. Paying for International Environmental Public Goods. *Ambio* 40:798–806. (Discusses different types of public goods and implications for their provision.)

Squires, D. 2014. "Biodiversity Conservation in Asia." *Asia & The Pacific Policy Studies* 1(1): 144-159. (Although focused on Asia, covers general topic of biodiversity conservation in an integrated manner, major economic concepts, and policy tools.)

Milner-Gulland, E.J. and R. Mace. "Practical Considerations When Applying the Theory." Chapter 4, **Sections 4.3**. **& 4.4.** in Milner-Gulland and Mace, *Conservation of Biological Resources*. Blackwell Sciences. (Reviews most of the major economic concepts and policy tools introduced and developed in this class.)

**General Source of Conservation Information**
Mongabay.com and news.mongabay.com

**Evaluation: Exams, Grades, and Re-Grades**

- One midterm and final exam, each of which is 50% of the final course grade.
- You will not be explicitly tested on examples from readings other than the case studies in class.
- Bluebooks may be required.
- Re-grade requests are to be made in writing and must explain the reason why a re-grade is requested, i.e. a logical discussion and thorough explanation of why your answer deserves more credit. Exam answers must be written in pen to be eligible for a re-grade.

## 1. Introduction

- Powerpoint Lecture: 1. Introduction
- Purpose: Review basic biodiversity status of the planet and how economics of conservation approaches this issue.

- Pimm, S.L., C.N. Jenkins, R. Abell, J.L. Gittleman, L.N. Joppa, P.H. Raven, C.M. Roberts, and J.O. Sexton. 2014. The Biodiversity of Species and Their Rates of Extinction, Distribution, and Protection. *Science* 344(6187) doi: 10.1126/science.1246752 (Skim to get idea of severity of biodiversity problem.)
- Barnosky et al. 2011. Has the Earth's Six Mass Extinction Already Arrived? *Nature* 471(7336): 51-57. (Skim to get idea of severity of biodiversity problem.)
- Browse one of the two following reports to get the basic overview:
- Millennium Ecosystem Assessment Synthesis. 2005. *Ecosystems and Human Well-Being: Biodiversity Synthesis.* Washington, D.C.: World Resources Institute. (Browse through the executive summary to get an idea of the factual background and issues.)
- Convention on Biodiversity Conservation. 2010. *Global Biodiversity Outlook* 3. Browse through this. You can also watch a short video on this at: http://www.cbd.int/gbo3/
- Squires, D. 2014. "Biodiversity Conservation in Asia." Asia & The Pacific Policy Studies 1(1): 144-159. (Skim to give you a sense of how economics of conservation is applied to develop policies. You likely won't understand all the concepts and details, but this gives you a sense of the big picture and the overall aim of this class.)

## 2. Review of Economic Concepts

### 2.1. Externalities and Market Failure

- Powerpoint Lecture: 2. Environmental Externalities and Market Failure
  Purpose: Review basic economic concepts.

- Readings: Optional. Review any of these readings if you want a refresher.
- Tisdell, C. 2007. *Economics of Environmental Conservation*. Edward Elgar. Chapter 3. (Reference material. Discusses basic environmental, conservation, and resource economics.)
- Milner-Gulland, E.J. and R. Mace. "Practical Considerations When Applying the Theory." Chapter 4, **Section 4.3.**. in Milner-Gulland and Mace, *Conservation of Biological Resources*. Blackwell Sciences. (Reviews most of the major economic concepts and policy tools introduced and developed in this class.)
- Illustration of Coase Theorem:

http://www.sjsu.edu/faculty/watkins/coasetheorem.htm

### 2.2. Total Economic Value and Markets for Biodiversity

- Powerpoint Lecture: 3. Biodiversity Markets
- Purpose: Develop concept of total economic value and present various types of markets for biodiversity.

- Total Economic Value, pp. 129-137 in D. W. Pearce and R.K. Turner, 1990. *Economics of Natural Resources and the Environment*. London: Harvester Wheatsheaf. (Read.Textbook discussion of total economic value and the classification used in this class.)
- Example: Naidoo, Malcom, and Tomasek. 2009. Economic Benefits of Standing Forests in Highland Areas of Borneo: Quantification and Policy Impacts. *Conservation Letters* 2: 34-44. (Skim to get basic idea and an example.)
- Example: Adger, W. N., Brown, K., Cervigni, R., & Moran, D. 1995. Total Economic Value of Forests in Mexico, *Ambio* 24 (5): 286-296 (Skim to get the basic idea and an example.)

### 2.3. Opportunity Costs of Conservation: Impacts on Local Inhabitants

- Powerpoint Lecture: 4. Opportunity Costs of Conservation
- Purpose: Conservation policies yield economic benefits but also economic create costs, both direct (out of pocket) and indirect costs. These indirect costs of conservation are the opportunity costs of conservation. This lecture develops the concepts and basic measurement.

- Example: Norton-Griffiths, M. and C. Southey. 1995. The opportunity costs of biodiversity conservation in Kenya. *Ecological Economics* 12(2): 125-139.
- Example: Butler, R., L.P. Koh, and J. Ghazoul. 2009. REDD in the red: Palm oil could undermine carbon payment schemes. *Conservation Letters* 2(2): 67-73.
- Borneo rain forests: http://www.timesonline.co.uk/tol/news/world/asia/article5908207.ece

### 2.4. Economic Efficiency and the Mitigation Hierarchy

- Powerpoint Lecture: 5. Economic Efficiency and the Mitigation Hierarchy
- Purpose: Develop the mitigation hierarchy framework and how partial and full compensation fit in, yielding partial net gain, no net loss, and net gain. Integrate economic efficiency, including least-cost conservation, into the biodiversity mitigation hierarchy.

- Garcia, S.M. and D. Squires. 2016. “Economic Efficiency and the Mitigation Hierarchy.” Gland: Draft working paper, June 2010, IUCN Fisheries Expert Group.

### 2.5. Costs, Benefits, and Discounting

- Powerpoint Lecture: 6. Costs, Benefits, and Discounting
- Purpose: Introduce the economics of cost-benefit analysis and social discounting. This is a basic framework by which economics evaluates the costs and benefits of policies.

- Sinden, Chpt. 5 “Valuation with Market Prices” and Sinden, Appendices.
- Example: Naidoo and Ricketts. 2006. Mapping the economic costs and benefits of conservation. *PLoS Biology* 4(11): 2153-2164. (Skim: Case study that clearly discusses concepts and illustrates benefits and costs of conservation.)
- Video: Kahn Academy, Economic Profit versus Account Profit (includes opportunity cost) https://www.khanacademy.org/economics-finance-domain/microeconomics/firm-economic-profit/economic-profit-tutorial/v/economic-profit-vs-accounting-profit

### 2.6. Property Rights

- Powerpoint Lecture: 7. Property Rights
- Purpose: Introduce the economics of property rights, including types of rights and characteristics of rights.

- Squires, D. 2010. Property and Use Rights in Fisheries. In R. Allen, J. Joseph, and D. Squires, editors, *Conservation and Management of Transnational Fishing Industries*. Blackwell Publishing. **Read pages 39-44.** (Discusses different types of property rights and characteristics of property rights.)
- Example: Norton-Griffiths, M. 1996. Property rights and the marginal wildebeest: an economic analysis of wildlife conservation options in Kenya. *Biodiversity and Conservation* 5: 1557-1577. (Read to see an illustration of the importance of property rights and the importance of many of the basic economic concepts.)

### 2.7. Public Goods, Common Resources, Coase Theorem

- Powerpoint Lecture: 8. Impure Public Goods (two lectures)
- Purpose: Introduce pure and impure public goods, also known as mixed goods, and the different ways in which they can be provided.

- Aylward, Appropriating the value of wildlife and wildlands, Chapter 3 in Swanson and Barbier. **Read pages 34-40**. (Discusses basic public good approach to conservation.)
- Arriagada, R. and C. Perrings. 2011. Paying for International Environmental Public Goods. *Ambio* 40:798–806. (Discusses different types of public goods and implications for their provision.)
- Bulte, van Kooten, and Swanson. 2003. Economic Incentives and Wildlife Conservation. **Read Section 1.**
- Video: Kahn Academy, Negative Externalities https://www.khanacademy.org/economics-finance-domain/microeconomics/consumer-producer-surplus/externalities-topic/v/negative-externalities
- Video: Kahn Academy, Taxes for Negative Externalities https://www.khanacademy.org/economics-finance-domain/microeconomics/consumer-producer-surplus/externalities-topic/v/taxes-for-factoring-in-negative-externalities
- Video: Kahn Academy, Positive Externalities https://www.khanacademy.org/economics-finance-domain/microeconomics/consumer-producer-surplus/externalities-topic/v/positive-externalities
- Video: Kahn Academy, Tragedy of the Commons https://www.khanacademy.org/economics-finance-domain/microeconomics/consumer-producer-surplus/externalities-topic/v/tragedy-of-the-commons

### 2.8. Collective Action, Social Norms, and Economic Incentives

- I'm not covering the topic this year in order to leave more time for case studies.
- Powerpoint Lecture: 9. Collective Action and Social Norms
- Purpose: Introduce social norms, an important complement to economic incentives.

- Baland, J.P. and J.-P. Platteau. Conditions for Successful Collective Action: Insights from Field Experiences. Chapter 12 in *Halting Degradation of Natural Resources.* Food and Agriculture Organization of the United Nations, selected pages.
- Young, P. 2008. Social Norms. *New Palgrave Dictionary of Economics*, *Second Edition*, edited by S.N. Durlauf and L.E. Blume. London: Macmillan. (You can skip over the game theory references. Read to learn the basic concepts.)
- Example: Milner-Gulland, E J and Leader-Williams, N. 1992. A Model of Incentives for Illegal Exploitation of Rhinos and Elephants: Poaching Pays in Luangwa Valley, Zambia. *Journal of Applied Ecology*, 29(2): 388-401. (Skim to see economic incentives and poaching.)

- Example: Jones, J., M. Andriamarovololona, and N. Hockley. 2008. The Importance of Taboos and Social Norms to Conservation in Madagascar. *Conservation Biology* 22(4): 976-986. (Skim this to see an example.)
- Example: Kerr, J., M. Vardhan, R. Jindal. 2012. Prosocial behavior and incentives: Evidence from field experiments in rural Mexico and Tanzania. *Ecological Economics* 73: 220-227. (Discusses an experiment to evaluate when social norms / norm-based collective action and monetary economic incentives work best when common property is involved.)

**3. Biodiversity and Ecosystem Services**

- Polasky, Costello, and Solow, The Economics of Biodiversity. Sections 2 and 3
- Heal, G. 2004. Economics of biodiversity: An introduction. *Resource and Energy Economics* 26: 105-114.

**3.1. Biodiversity and Ecosystem Services**

- Powerpoint Lecture: 10. Ecosystem Services
- Purpose: This short lecture covers MEA's 5 ecosystem services, provides definitions and basic background, etc.

- Polasky, Costello, and Solow, The Economics of Biodiversity **Read Section 3.3**.
- Aylward, Appropriating the Value of Wildlife and Wildlands, Chapter 3 in Swanson and Barbier. **Read pages 49-61**.
- Perrings, C., Naeem, S., Ahrestani, F., Bunker, D. E., Burkill, P., Canziani, G., Elmqvist, T., et al. (2010). Ecosystem Services for 2020. *Science*, *330*(6002), 323 -324. (Skim if you want to read more.)

Supplemental Material

- Barker et al. Biodiversity, Ecosystems and Ecosystem Services. Chapter 2 in TEEB (2010) *The Economics of Ecosystems and Biodiversity: The Ecological and Economic Foundations*. Edited by Pushpam Kumar. London and Washington: Earthscan. (Read as much as you want for a general biological background. You won't be tested on any of this material.)
- UNEP. Ecosystems and Their Services. (Excellent introduction to ecosystems and their services for a lay person. Skim if you like.)

**3.2. Sustainability**

- I don't cover this section, but included for comprehensiveness.

- Arrow, K. et al. 1995. Economic growth, carrying capacity, and the environment. *Science* 268: 520-521.
- Callicott, J.B. and K Mumford. 1997. Ecological sustainability as a conservation concept. *Conservation Biology* 11(1): 32-40.

**MIDTERM FOR 2016 COVERS ALL MATERIAL THROUGH SECTION 3**

## 4. Command-and-Control Conservation: Quota Schemes and Protected Areas

- Bulte et al. Section 3.1.

### 4.1. Protected Areas & Habitat Conversion: 1/2 Lecture

- I'm not fully covering the topic this year in order to leave more time for case studies. Instead an abbreviated lecture introduces the relevant considerations from the literature.
- Powerpoint Lecture 11_Short: Protected Areas and Habitat Conversion (< 0.5 full lecture)
- Purpose: Discuss habitat conversion and protected areas, still the most fundamental and important conservation tool.

- Ferraro, P.J., M.M. Hanauer, and K.R.E. Sims. 2011. Conditions Associated with Protected Area Success in Conservation and Poverty Reduction. *Proceedings of the National Academy of Sciences of the United States of America* 108(34): 13913-13918.
- Joppa, L.N. and A. Pfaff. 2010. Global Area Protected Impacts. *Proceedings of the Royal Society B: Biological Sciences* 278(1712): 1633-1638. (Read only Section 1 & Section 4 for the main points, unless you are interested in the details of the study and how it was done.)
- Craigie, I.D., J.E.M. Braille, A. Balmford, C. Carbone, B. Collen, R.E. Green. 2010. Large Mammal Population Declines in Africa's Protected Areas. *Biological Conservation* 143: 2221-2228. (Skim to get the main empirical points. Don't worry about methodology or quantitative details.)
- Miteva, D, S. Pattanayak, and P. Ferraro. 2012. Evaluation of Biodiversity Policy Instruments: What Works and Doesn't? *Oxford Review of Economic Policy* 28(1): 69-92. (Skip the discussion of Section II.i. and Section IV.)

## 5. Direct Incentive Approaches: Markets and Market-Based Policy

### 5.1. Direct and Indirect Incentives for Conservation

- Powerpoint Lecture: 12. Direct and Indirect Conservation (1 lecture)
- Purpose: Introduces direct conservation, which establishes direct incentives to conserve, and indirect conservation, which establishes

indirect incentives to conserve through primarily enhancing employment and incomes and redirecting economic activity away from those that harm biodiversity or activities that create conservation as an indirect outcome.

- Polasky, Costello, and Solow, The Economics of Biodiversity. **Section 5**
- Bulte, E., G. van Kooten, and T. Swanson. 2003. Economic Incentives and Wildlife Conservation. **Read Sections 2 and 3**.
- Gjertsen, H. and T. Stevenson. 2011. Direct Incentives for Leatherback Turtle Conservation. Chapter 11 in P. Dutton, D. Squires, and M. Ahmed, editors. *Conservation of Pacific Sea Turtles*. Honolulu: University of Hawaii Press. (Read only pages 164-170.)

### 5.2. Payments for Environmental Services (PES)

- Powerpoint Lecture: 13. Conservation Payments (1.5 lectures)
- Purpose: Introduce payments for ecosystem services, which are the primary form of direct conservation incentives and approaches.

- Engle, S., S. Pagiola, and S. Wunder. 2008. Designing payments for environmental services in theory and practice: An overview of the issues. *Ecological Economics* 65(4): 663-674. (The gold standard reading defining PES. Start with this paper to lay out and define PES.)
- Kinzig, A.P., Perrings, C., Chapin, F.S., Polasky, S., Smith, V.K., Tilman, D. & Turner, B.L. 2011. Paying for Ecosystem Services: Promise and Peril. *Science*, 334: 603-604.
- Marshall, L. and M. Selman. 2010. Markets for Ecosystem Services: Principles, Objectives, Designs, and Dilemmas. Washington, D.C. World Resources Institute.
- Example: Nelson, F. et al. 2009. Payments for Ecosystem Services as a Framework for Community-Based Conservation in Northern Tanzania. *Conservation Biology* 24(1): 78-85. (Skim to see an example.)
- YouTube Video: Sven Wunder on PES http://www.youtube.com/watch?v=uNGPF1CdK-4

### 5.3. Biodiversity Offsets

- Powerpoint Lecture: 14. Biodiversity Offsets (1 lecture)
- Purpose: Discuss biodiversity offsets, both as a residual, last-resort approach after all other approaches in the mitigation hierarchy have been exhausted (the conventional approach) and as a least-cost, complementary conservation activity that is undertaken earlier in the mitigation hierarchy. Biodiversity offsets are voluntary provision of public goods.

- Bull, J., K. Suttle, A. Gordon, N. Singh, and E.J. Milner-Gulland. Biodiversity Offsets in Theory and Practice. 2013. *Oryx* 47(3): 369-380.

- Gjertsen, H., D. Squires, P. Dutton, and T. Eguchi. 2014. Cost-Effectiveness of Alternative Conservation Strategies with Application to the Pacific Leatherback Turtle. *Conservation Biology* 28(1): 140-149 doi: 10.1111/cobi.12239 (Skim: illustrates the advantages of least-cost conservation and starting offsets earlier in the mitigation hierarchy as a complementary activity rather than as a residual, last-resort activity.)

## 6. Indirect Incentives Approaches: Community Conservation, Alternative Livelihoods, and Eco-Tourism

### 6.1. Community Conservation and Integrated Conservation and Development Projects: NOT Covered in 2016

- I'm not covering the topic this year in order to leave more time for case studies
- Powerpoint Lecture: 15. Community Conservation (1.5-2 lectures)
- Purpose: Discuss a key form of indirect conservation, community conservation, which is also called Integrated Conservation and Development Projects.

- Milner-Gulland, E.J. and R. Mace. "Practical Considerations When Applying the Theory." Chapter 4, **Sections 4.4., pages 155-163** in Milner-Gulland and Mace, *Conservation of Biological Resources*. Blackwell Sciences.
- Bulte, E., G. van Kooten, and T. Swanson. 2003. Economic Incentives and Wildlife Conservation, **Section 2.1, pages 13-15**.
- Hackel, J. 1999. Community Conservation and the Future of Africa's Wildlife. *Conservation Biology* 13(4): 726-734.
- Hughes, R. and F. Flintan. 2001. Integrating Conservation and Development Experience: *A Review and Bibliography of the ICDP Literature*: London: International Institute for Environment and Development. (Read pages 1-11 [through Section 2.5])
- Example: Jackson, R. 2004. Pakistan's Community-based Trophy Hunting Programs and Their Relationship to Snow Leopard Conservation.

### 6.2. Indirect Incentives: Eco-Tourism

- Powerpoint Lecture: 16. Ecotourism (2 lectures)
- Purpose: Discuss eco-tourism, which is an indirect conservation approach.

- Barnes, Burgess, and Pearce. Wildlife tourism, Chapter 6 in Swanson and Barbier, editors. 1992. *Economics for the Wilds.*
- Hussain S. 2000. Protecting the Snow Leopard and Enhancing Farmers' Livelihoods. *Mountain Research and Development* 20(3): 226-331.

- Jackson, R. 2004. Pakistan's Community-based Trophy Hunting Programs and Their Relationship to Snow Leopard Conservation.
- Lindsey, P.A. 2007. "Economic and Conservation Significance of the Trophy Hunting Industry in Sub-Saharan Africa." *Biological Conservation* 134: 455-469.

Further Reading (Not Required):

- Jackson, R. and R. Wangchuk. 2004. A Community-Based Approach to Mitigating Livestock Depredation by Snow Leopards. *Human Dimensions of Wildlife*, 9: 307–315
- Mishra, C., Allen, P., McCarthy, T., Madhusan, M. D., Bayarjargal, A., & Prins, H. T. 2003. The Role of Incentive Programs in Conserving the Snow Leopard*. Biological Conservation 17*(6): 1512–1520.
- Li, J. et al. 2013. Role of Tibetan Buddhist Monasteries in Snow Leopard Conservation. *Conservation Biology* 28(1): 87-94.

### 6.3. Decentralization: NOT Covered in 2016

- I'm not covering the topic this year in order to leave more time for case studies
- Purpose: This is decentralized provision of local public goods. Community Conservation Section 6.1. (Powerpoint 14) covers provision by communities and this concerns governments and other organizations.

- Enters, T. and J. Anderson. 1999. Rethinking the Decentralization and Devolution of Biodiversity Conservation. *Unasylva* 50(4). Decentralization and Devolution in Forestry. Rome: Food and Agriculture Organization of the United Nations. http://www.fao.org/docrep/x3030e/x3030e04.htm#rethinking%20the%20decentralization%20and%20devolution%20of%20biodiversity%20conservation
- Examples: Wyckoff-Baird, B., A. Kaus, C.A. Christen, and M. Keck. 2013. *Shifting the Power: Decentralization and Biodiversity Conservation*. Biodiversity Support Program, United States Agency for International Development, Washington, D.C. (Skim for update on current view of effectiveness and case studies. An easy read.)

## 7. Applications and Case Studies

### 7.1. Game Ranching

- Powerpoint Lecture: 17. Game Ranching Illegal Trade (1.5 lectures)
- Purpose: Discuss a powerful and controversial economic conservation policy instrument.

*Guardian* Newspaper: http://www.theguardian.com/vital-signs/2015/aug/03/cecil-lion-ivory-online-wildlife-trafficking-ebay
*Guardian* Newspaper: http://www.theguardian.com/vital-signs/2015/may/11/poaching-white-rhino-south-africa-texas-rhinoceros
*New York Times*: http://www.nytimes.com/2015/08/11/world/africa/outcry-for-cecil-the-lion-could-undercut-conservation-efforts.html?action=click&pgtype=Homepage&version=Moth-Visible&module=inside-nyt-region&region=inside-nyt-region&WT.nav=inside-nyt-region&_r=0
*New York Times*: Africa's Big 5 Trophy Animals: http://www.nytimes.com/interactive/2015/08/10/world/africa/africa-big-game-hunting.html?_r=1

- Luxmoore, R. and T. Swanson. 1992. Wildlife and Wildland Utilization and Conservation, Chapter 5 in Swanson and Barbier, eds., *Economics for the Wilds: Wildlife, Diversity, and Development,* 1992.
- Erwin Bulte and Richard Damania, "An Economic Assessment of Wildlife Farming and Conservation," *Conservation Biology,* Vol. 19, No. 4, August 2005, pp. 1222-1233.
- Norton-Griffith, Michael. 2003. The Case for Private Sector Investment in Conservation: An African Perspective. Vth World Park Congress, Durban, South Africa, 7 pp. (An easy read. A real blast against state bureaucracies and in favor of private sector involvement in conservation.)

### 7.2. The Tiger

- Powerpoint Lecture: 18. Tigers (1.5 lectures)
- Purpose: Discuss status of tigers and a comprehensive conservation policy that utilizes all of the concepts the class has covered.

- Background: http://www.21stcenturytiger.org/index.php?pg=facts
- World Bank. 2008. *A Future for Wild Tigers*, 36 pp.
- Mitra, B. 2006. Sell the Tiger to Save It." *New York Times*. August 15, 2006. http://www.nytimes.com/2006/08/15/opinion/15mitra.html?_r=1
- Zabel, A. and K. Holm-Müller. 2008. Conservation Performance Payments for Carnivore Conservation in Sweden. *Conservation Biology* 22(2): 247-251.

### 7.3. African Elephants, Rhinos, and Illegal Trade

- Powerpoint Lecture: 19. Elephants, Rhinos, Illegal Trade (1 lecture)
- Purpose: Trade in ivory and rhino horns and poaching pose serious threats to African elephants and rhinos. These animals could disappear from many parts of the continent for good. Illegal trade in ivory and horns

fuels much of the poaching. Other threats are habitat loss that we discuss elsewhere.

- Video: History of Ivory Trade, *National Geographic* http://education.nationalgeographic.com/media/history-ivory-trade/
- *New York Times* on elephants: http://topics.nytimes.com/top/reference/timestopics/subjects/e/elephants/index.html
- *New York Times* on illegal wildlife trade: http://www.nytimes.com/2015/02/12/us/politics/obama-administration-to-target-illegal-wildlife-trafficking.html?_r=0
- *Guardian* Newspaper on rhinos: http://www.theguardian.com/world/2015/may/11/rhino-poaching-in-south-africa-at-record-levels-following-18-rise-in-killings
- Yahoo on rhinos: https://www.yahoo.com/travel/title-on-the-frontlines-of-the-rhino-genocide-96923355312.html
- *Guardian* Newspaper on rhinos: http://www.theguardian.com/environment/2015/jan/22/record-number-rhinos-killed-south-africa-2014
- *Washington Post* on illegal trade: http://www.washingtonpost.com/national/health-science/overwhelmed-us-port-inspectors-unable-to-keep-up-with-illegal-wildlife-trade/2014/10/17/2fc72086-fe42-11e3-b1f4-8e77c632c07b_story.html
- *National Geographic*. Can Elephants Survive A Legal Ivory Trade? Debate is Shifting Against It. (Popular press article. Easy to read.) http://news.nationalgeographic.com/news/2014/08/140829-elephants-trophy-hunting-poaching-ivory-ban-cities/
- VICE NEWS on California Law on Selling Ivory and Rhino Horn: https://news.vice.com/article/its-going-to-be-a-bit-harder-to-sell-ivory-and-rhino-horn-in-california

- Wasser et al. 2014. "Elephants, Ivory, and Trade." *Science* 327: 1331-1332.
- Lemieux, A. and A. Clarke. 2009. "The International Ban on Ivory Sales and Its Effects on Elephant Poaching in Africa." *British Journal of Criminology* 49: 451-471.
- Bennett, E.L. 2014. "Legal Ivory Trade in a Corrupt World and Its Impact on African Elephant Populations." *Conservation Biology* 29(1): 54-60.

7.4. **Forests, Carbon, REDD+**

- Powerpoint Lecture: 20. Forests, Carbon, and REDD+ (1 hour)
- Introduction to the concepts and opportunities of forest carbon and carbon markets, with an emphasis on emission reduction schemes, avoided deforestation, and opportunity costs of conservation.

- Godfrey, L. 2011. Conquering Nature: The Implications of Assigning Economic Values to Global Commons. e-International Relations.
- Hufty, M. and A. Haakenstad. 2011. Reduced Emissions for Deforestation and Degradation: A Critical Review. *Consilience: The Journal of Sustainable Development* 5(1): 1-24.

Guardian Newspaper: http://www.theguardian.com/world/2015/nov/24/redd-papua-new-guinea-money-grow-on-trees?INTCMP=the-essential-read-automated

**7.5. Poaching**

- Powerpoint Lecture: 21. Poaching
- Purpose: Further discuss poaching and illegal wildlife exploitation.

- Milner-Gulland, E.J. and N. Leader-Williams. Illegal Exploitation of Wildlife. Chapter 9 in T.M. and E. Barbier, editors. 1992. *Economics for the Wilds: Wildlife, Diversity, and Development*. Island Press, Washington, D.C.
- Messer, K.D. 2010. Protecting Endangered Species: When Are Shoot-On-Sight Policies The Only Viable Option to Stop Poaching? *Ecological Economics* 69: 2334-2340.
- Challender, D.W.S. and D.C. MacMillan. 2014. Poaching is More Than An Enforcement Problem. *Conservation Letters* 7: 484-494. doi: 10.1111/conl.12082
- Economist Magazine: Big Game Poachers http://www.economist.com/news/middle-east-and-africa/21631202-claims-links-between-politicians-and-poachers-merit-further-investigation-big
- *New York Times* article http://www.nytimes.com/2012/09/04/world/africa/africas-elephants-are-being-slaughtered-in-poaching-frenzy.html?pagewanted=all&_r=0
- *National Geographic* article http://ngm.nationalgeographic.com/2012/10/ivory/christy-text
- http://iccfoundation.us/index.php?option=com_content&view=article&id=445&Itemid=367

**7.5. Snow Leopards**

- Hussain S. 2000. Protecting the Snow Leopard and Enhancing Farmers' Livelihoods. Mountain Research and Development 20(3): 226-331.
- Jackson, R. and R. Wangchuk. 2004. A Community-Based Approach to Mitigating Livestock Depredation by Snow Leopards. *Human Dimensions of Wildlife*, 9: 307–315
- Mishra, C., Allen, P., McCarthy, T., Madhusan, M. D., Bayarjargal, A., & Prins, H. T. 2003. The role of incentive programs in conserving the snow leopard. *Biological Conservation 17*(6), 1512–1520.

- Jackson, R. 2004. Pakistan's Community-based Trophy Hunting Programs and Their Relationship to Snow Leopard Conservation.

Further Reading (Not Required):

- Jackson, R. and R. Wangchuk. 2004. A Community-Based Approach to Mitigating Livestock Depredation by Snow Leopards. *Human Dimensions of Wildlife*, 9: 307–315
- Mishra, C., Allen, P., McCarthy, T., Madhusan, M. D., Bayarjargal, A., & Prins, H. T. 2003. The role of incentive programs in conserving the snow leopard. *Biological Conservation 17*(6), 1512–1520.
- Li, J. et al. 2013. Role of Tibetan Buddhist Monasteries in Snow Leopard Conservation. *Conservation Biology* 28(1): 87-94.
- Mishra, C., et al. 2003. The Role of Incentive Programs in Conserving Snow Leopards. *Conservation Biology* 17(6): 1512-1520.