

Economics 144
Economics of Conservation
Summer Session II

Course Hours: MW 2:00 – 4:50 PM **Classroom:** CSB 001

Instructor: Dale Squires dsquires@irpsmail.ucsd.edu

Office: Econ 108 **Office Hours:** Immediately preceding class or by appt

Course Dates: Monday, August 6 – Saturday, September 8, 2012

Final: Saturday, September 8, 3:00 – 5:59pm Solis 107

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 opportunity costs to conservation; policies should be crafted utilizing both social norms and economic incentives to redirect individual and group human behavior and economic systems toward the social-ecological optimum that includes sustainability.

This is not a class in sustainable development; rather 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. Crafting such policies requires an appreciation of applied economic theory -- in particular that of common resources and impure public goods – and the implications that follow. 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: The Politics of Conservation in Developing Countries.

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.
- Most 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 to better understand the concepts.

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. Working paper.

Polasky, S, C Costello, and A Solow. 2005. The Economics of Biodiversity. Chapter 29 in K-G Mäler and J Vincent, editors, *Handbook of Environmental Economics*, Volume 3. Elsevier. (Comprehensive survey paper on the economics of conservation of biodiversity and ecosystem services.)

Squires, D., A. Khan, M. Smith, and N. Vestergaard. 2012. Rethinking Marine Conservation: From Solving the Commons Problem to Conservation and Management of Impure Public Goods. Working paper.

General Source of Information

Mongabay.com

Evaluation: Exams, Grades, and Re-Grades

- One midterm and final exam, each of which is 50% of the final course grade.
- Bluebooks are 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
- Millennium Ecosystem Assessment PowerPoint. (I cover a fair amount of this, but this extensive powerpoint summarizes the well-known MEA and gives lots of background facts on the problems. Skim this to get even more an idea of the factual background and issues.)
- Millennium Ecosystem Assessment Synthesis. 2005. *Ecosystems and Human Well-Being: Biodiversity Synthesis*. Washington, D.C.: World Resources Institute. (An alternative to the powerpoint listed above; skim through the executive summary to get an idea of the factual background and issues.)
- Polasky, Costello, and Solow. Economics of Biodiversity, Section 2. (Skim to get basic idea.)
- Norton-Griffiths. 2007. How Many Wildebeest Do You Need? *World Economics* 8(2): 41-64. (Read to understand many of the basic issues within a Kenya context.)
- Cardinale, B., J. Duffy, A. Gonzalez, D. Hooper, C. Perrings, P. Venail, Anita Narwani, G. Mace, D. Tilman, D.Wardle, A. Kinzig, G. Daily, M. Loreau, J. Grace, A. Larigauderie, D. Srivastava & S. Naeem. 2012. Biodiversity Loss and Its Impact on Humanity. *Nature* 486: 59-67. (Skim to get basic understanding of issues.)
- *Der Spiegel*. What would it cost to save nature? March 23, 2008.

<http://www.spiegel.de/international/world/0,1518,554982,00.html> (Read to get idea of the basic issues and magnitudes of economic values involved.)

Additional Reading (Not Required):

- Armsworth, P.R., B.E. Kendall, and P. Davis. 2004. An Introduction to Biodiversity Concepts for Environmental Economists. *Resource and Energy Economics* 26: 115-136. (Discusses basic conservation biology and ecological concepts.)
- Trombulak, S.C., K. S. Omland, J.A Robinson, J.J. Lusk, T.L. Fleischner, G. Brown and M Domroese. 2004. Principles of conservation biology: recommended guidelines for conservation literacy from the education committee of the Society for Conservation Biology. *Conservation Biology* 18(5): 1180-1190.
- Elmqvist, T., Maltby, E., Barker, T., Mortimer, M., Perrings, C., Aronson, J.L., de Groot, R., Fitter, A., Mace, G., Norberg, J., Sousa Pinto, I. & Ring, I. 2010. Biodiversity, Ecosystems and Ecosystem Services. *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations* (ed. by P. Kumar), pp. 41-112. Earthscan, London. (Read for basic conservation biology and ecological concepts. I won't test you on these concepts, but you should have read them and gotten the basic idea.)
- Pearce, D. and D. Moran. 1994. The Economic Value of Biodiversity. IUCN — The World Conservation Union. London: Earthscan Publications. (Very comprehensive overview relying upon a basic benefit-cost approach.) Section 1. (Surveys basic biodiversity.)
- http://en.wikipedia.org/wiki/Conservation_biology

2. Review of Economic Concepts

2.1. Externalities

- Powerpoint Lecture: 2. Environmental Externalities and Market Failure (Reviews basic economic concepts)
- Tisdell, C. 2007. *Economics of Environmental Conservation*. Edward Elgar. Chapter 3. (Reference material. Discusses basic environmental, conservation, and resource economics.)

2.2. Total Economic Value and Markets for Biodiversity

- Powerpoint Lecture: 3. Biodiversity Markets
- 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. (Textbook discussion of total economic value and the classification used in this class.)

- Pagiola, Landell-Mills, and Bishop. 2002. Making market-based mechanisms work for forests and people. Chapter 15 in Pagiola, Bishop, and Landell-Mills, editors, *Selling Forest Environmental Services: Market-Based Mechanisms for Conservation and Development*. Earthscan.
- Barbier, Economics of the wilds, Chapter 2 in Swanson and Barbier, eds.
- Polasky, Costello, and Solow Section 3.
- 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)
- 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
- 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. Costs, Benefits, and Discounting

- Powerpoint Lecture: 5. Costs, Benefits, and Discounting
- Pearce, D. and D. Moran. 1994. The Economic Value of Biodiversity. IUCN — The World Conservation Union. London: Earthscan Publications. Sections 2, 3, and 9.
- 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. (Case study that clearly discusses concepts and illustrates benefits and costs of conservation.)
- Example: Gjertsen, H. 2010. Can We Improve Our Conservation Bang for the Buck? Cost-Effectiveness of Alternative Leatherback Turtle Conservation Strategies. Chapter 4 in P. Dutton, D. Squires, and M. Ahmed, editors, *Conservation of Pacific Sea Turtles*. Honolulu: University of Hawaii Press.

Further Reading (Not Required):

- Gowdy, J., R.B. Howarth, and C. Tisdell. 2010. Discounting, ethics and options for maintaining biodiversity and ecosystem integrity. Chapter 6 in P. Kumar, editor, *The Economics of Ecosystems and Biodiversity: The Ecological and Economic Foundations*. Earthscan.

2.5. Property Rights, Public Goods, Common Resources, Coase Theorem

- Powerpoint Lecture: 6. Property Rights
- Powerpoint Lecture: 7. Impure Public Goods
- 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 pp. 39-44.** (Discusses different types of property rights and characteristics of property rights.)
- Aylward, Appropriating the value of wildlife and wildlands, Chapter 3 in Swanson and Barbier. (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. **Section 1.1**
- 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.)

Further Reading (Not Required)

- Norton-Griffiths, M. 2006. The Economic Dimension to Human-Wildlife Conflicts. Paper presented to Strathmore Business School Conservation, Wildlife & Markets Conference and Workshop November 9-11. (Feisty defense of fundamental importance of property rights and aligning economic incentives with social-ecological objectives and importance of private sector.)

2.6. Collective Action, Social Norms, and Economic Incentives

- Powerpoint Lecture: 8. Collective Action Social Norms
- 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. (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. (Read 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, 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: 9. Ecosystem Services
- Polasky, Costello, and Solow, Section 3.3.
- Barbier, Economics for the Wilds, Chapter 2 in Swanson and Barbier
- Aylward, Appropriating the Value of Wildlife and Wildlands, Chapter 3 in Swanson and Barbier
- 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.

Further Reading (Not Required):

- Millennium Ecosystem Assessment PowerPoint. (I won't directly lecture on this, but this extensive powerpoint summarizes the well-known MEA and gives lots of background facts on the problems. Skim this to get an idea of the factual background and issues.)
- Millennium Ecosystem Assessment Synthesis. 2005. *Ecosystems and Human Well-Being: Biodiversity Synthesis*. Washington, D.C.: World Resources Institute. (An alternative to the powerpoint listed above; skim

- through the executive summary to get an idea of the factual background and issues.)
- Pagiola, S., K. von Ritter, and J. Bishop. 2004. Assessing the Economic Value of Ecosystem Conservation. Environment Paper No. 101, Environment Department, World Bank. (Good overview paper of the economics of conservation plus plenty of case studies.)

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.

4. Direct Incentive Approaches: Markets and Market-Based Policy

- Powerpoint Lecture: 10. Direct and Indirect Conservation
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- Polasky, Costello, and Solow, Section 5
- Bulte, E., G. van Kooten, and T. Swanson. 2003. Economic Incentives and Wildlife Conservation. **Sections 2 and 3.**
- Goulder, L. and I. Parry. 2008. Instrument choice in environmental policy. *Review of Environmental Economics and Policy* 2(2): 152-174. (Although within the context of standard environmental economics, this paper discusses most, although not all, of the economic instruments that are available for conservation policy.)

Further Reading (Not Required):

- Simpson, R.D. 2004. Conserving biodiversity through markets: A better approach. *PERC Policy Series* Issue Number PS-32: 1-28.
- Stavins, R. 2003. Experience with market-based environmental policy instruments. In *Handbook of Environmental Economics*, ed. M. Karl-Goran, and R.V. Jeffrey. Amsterdam: North Holland, 85 pp.
- Barrett, C.B., E. H. Bulte, P. Ferraro, and S. Wunder. No date. Economic Instruments for Nature Conservation
- Ostrom, E. 2010. Beyond markets and states: Polycentric governance of complex economic systems. *American Economic Review* 100: 641-672.

4.1. Command-and-Control Conservation: Quota Schemes

- Bulte et al. Section 3.1.

4.2. Payments for Environmental Services (PES)

- Powerpoint Lecture: 11. Conservation Payments
- Powerpoint Lecture: 12. Selling Environmental Services to help Finance Reforestation.
- 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.)
- 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.
- Jack, B.K., C. Kousky, and K. Sims. 2008. Designing Payments for Ecosystem Services: Lessons from Previous Experience with Incentive-Based Mechanisms. *Proceedings of the National Academy of Sciences* 105(28): 9465-9470.
- Cooley, D. and L. Olander. 2011. Stacking Ecosystem Service Payments: Risks and Solutions. Nicholas Institute for Environmental Policy Solutions
- Working Paper NI WP 11-04. Duke University, **Section 1. (Read Section 1 only** unless you want to delve deeper. Introduces basic idea of stacking and additonicity, both of which are discussed more extensively in this paper.)
- 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.)

Further Reading (Not Required):

- Pattanayak, S., S. Wunder, and P.J. Ferraro. 2010. Show Me the Money: Do Payments Supply Environmental Services in Developing Countries? *Review of Environmental Economics and Policy* 4(2): 252-274. (Comprehensive review of PES in developing countries.)
- Niesten, E., Gjertsen, H., Fong, P. In press. Incentives for Marine Conservation: Options for Small Island Developing States. *Environmental and Development Economics*. (Brings together the concepts of incentives, PES/direct conservation, and community/indirect conservation plus has three detailed case studies.)
- Gillenwater, M. 2012. What is Additionality? Implications for Stacking and Unbundling. Discussion Paper No. 003, Greenhouse Gas Management Institute, Silver Springs, Maryland.
- Bennett, K. 2010. Additionality: The Next Step for Ecosystem Service Markets. *Duke Environmental Law & Policy Forum* 20: 417-438.
- Woodward, R. T. 2011. Double-dipping in environmental markets. *Journal of Environmental Economics and Management* 61(2): 153-169.

4.3. Compensatory Mitigation / Biodiversity Offsets

- Powerpoint Lecture: Offsets
- Madsen, B., N. Carroll, and K. Moore. 2010. Offset and compensation programs worldwide. Washington: Ecosystem Marketplace.

Further Reading (Not Required):

- Boonie, R. 1999. Endangered species mitigation banking: promoting recovery through habitat conservation planning under the Endangered Species Act. *Science of the Total Environment* 240: 11-19.
- Burgin, S. 2008. BioBanking: an environmental scientist's view of the role of biodiversity banking offsets in conservation. *Biodiversity Conservation* 17:807–816.
- Salzman, J. and J. Ruhl. 2000. Currencies and the Commodification of Environmental Law. *Stanford Law Review* 53(3): 607-694.
- Wissel, S. and F. Wätzold. 2010. A Conceptual Analysis of the Application of Tradable Permits to Biodiversity Conservation. *Conservation Biology* 24(2): 404-411.

4.4. Eco-Tourism

- Powerpoint: Ecotourism
- Barnes, Burgess, and Pearce. Wildlife tourism, Chapter 6 in Swanson and Barbier, editors. 1992. *Economics for the Wilds*.

4.5. International Conventions, Markets, and Trade

- Swanson, T. 1992. The role of wildlife utilization and other policies in biodiversity conservation, Chapter 4 in Swanson and Barbier, editors. 1992. *Economics for the Wilds*. (Skim this for basic idea, some of the material is dated by now.)
- Ginsberg, J. 2002. CITES at 30 or 40. *Conservation Biology* 16(5): 1184-1191.
- Thorbjarnarson, J. 1999. Crocodile tears and skins: international trade, economic constraints, and limits to sustainable use of crocodilians. *Conservation Biology* 13(3): 465-470.
- Wasser, S. Elephants, Ivory and Trade. *Science* 12 March 2010. Vol. 327. No. 5971, 1331 – 1332.
- Norton-Griffiths, M. Some Thoughts on the International Ban on the Ivory Trade, 4pp. (Feisty and contrarian viewpoint! Only four pages.)

Further Reading (Not Required):

- Gillson, L. and K. Lindsay. 2003. Ivory and ecology – changing perspectives on elephant management and the international trade in ivory. *Environmental Science & Policy* 6(5): 411-419.

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5. Indirect Incentives Approaches: Protected Areas, Community Conservation, and Alternative Livelihoods

- Powerpoint Lecture: Community Conservation
- Barbier. Community-Based Development in Africa. Chapter 5 in Swanson and Barbier, eds., *Economics for the Wilds: Wildlife, Diversity, and Development*, 1992. (Discusses community-based conservation and alternative livelihoods and CAMPFIRE program. Skim chapter for basic points and CAMPFIRE illustration. Some of the material is dated by now.)
- Bulte, E., G. van Kooten, and T. Swanson. 2003. Economic Incentives and Wildlife Conservation, Section 2.1, pp. 13-15.
- Coad, L., A. Campbell, L. Miles, and K. Humphries. 2008. The Costs and Benefits of Forest Protected Areas for Local Livelihoods: A Review of the Current Literature. United Nations Environment Program. (Reviews a lot of the protected area literature from the perspective of costs and benefits.)
- Example: Jackson, R.. 2004. Pakistan's Community-based Trophy Hunting Programs and Their Relationship to Snow Leopard Conservation.
- McNeely

Further Reading (Not Required):

- Wilshusen, P., S. Brechin, C. Fortwangler, and P. West. 2002. Reinventing a Square Wheel: Critique of a Resurgent "Protection Paradigm" in International Biodiversity Conservation. *Society and Natural Resources* 15: 17-40. (Discusses renewed interest in top-down imposition of protected areas.)
- Ferraro, P. and M. Hanauer. 2010. [Protecting Ecosystems and Alleviating Poverty with Parks and Reserves: 'Win-Win' or Tradeoffs?](#) *Environmental and Resource Economics* 48(2): 269-286. (An empirical analysis of impact of protected areas / parks on well-being of adjacent inhabitants.)
- Naughton-treves, L., J. Alix-Garcia, and C. Chapman. 2011. Lessons about parks and poverty from a decade of forest loss and economic growth around Kibale National Park, Uganda. *Proceedings of the National Academy of Sciences* (An empirical analysis of impact of protected areas / parks on well-being of adjacent inhabitants.)

- Sims, K. The Effects of Protected Areas on Land Use and Local Economic Development: Evidence from Northern Thailand. (An empirical analysis of impact of protected areas / parks on well-being of adjacent inhabitants.)
- Berkes, F. 2004. Rethinking community-based conservation. *Conservation Biology* 18(3): 621-630.

6. Applications and Case Studies

6.1. Forests, Carbon, REDD+

- 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.

6.2. Game Ranching

- Powerpoint Lecture: Game Ranching Illegal Trade
- 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.)

6.3. The Tiger

- Powerpoint Lecture: Tigers
- 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.

Further Reading (Not Required)

- Can the Wild Tiger Survive? by Virginia Morrell. *Science* vol. 317 September 2007
- B. Gratwicke, E. Bennett, S. Broad, S. Christie, A. Dutton, G. Gabriel, C. Kirkpatrick, and K. Nowell. 2008. "The World Can't Have Wild Tigers and Eat Them, Too." *Conservation Biology*, 22(1): 222–223.
- M. Linkie and S. Christie. 2007. "The Value of Wild Tiger Conservation." *Oryx*, 41(4): 415–416.
- Mitra, B. 2006. Sell the Tiger to Save It." *New York Times*. August 15, 2006.
- Abbott, B. and G.C. van Kooten. 2011. Can Domestication of Wildlife Lead to Conservation? The Economics of Tiger Farming in China." *Ecological Economics* 70(4): 721-728.

6.4. 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.

6.5. BIGHORN SHEEP/MOUNTAIN LIONS/WOLVES

- Guest Speaker

6.5. The Vaquita

- Guest Speaker
- Jaramillo-Legorreta, A., L. Rojas-Bracho, R. Brownell Jr., A. Read, R. Reeves, K. Ralls, and B. Taylor. 2007. Saving the Vaquita: Immediate action, not more data. *Conservation Biology* 21(6): 1653–1655.
- D'agrosa, C., C. Lennert-Cody, O. Vidal. 2000. Vaquita Bycatch in Mexico's Artisanal Gillnet Fisheries: Driving a Small Population to Extinction. *Conservation Biology* 14(4): 1110-1119.
- Barlow, J., L. Rojas Bracho, C. Muñoz, S. Mesnick. In press 2009. Conservation of the Vaquita (*Phocoena sinus*) in the northern Gulf of California, Mexico, in R.Q. Grafton, R. Hilborn, D. Squires, M. Tait, and M.

Williams, editors, *Handbook of Global Fisheries Management*. Oxford: Oxford University Press.

6.5. Migratory Species

- Guest speaker on migratory seabirds

6.6. Conservation in San Diego County

- Guest speaker