

Finally, the studies on resource scarcity suggest that it is important, for the users, to be informed both on the resource's dynamics, and on possible thresholds and risks that could lead to regime shifts or generally to a lower productivity of the resource. This can lead to higher rates of compliance with the rules, and as a deterrent to short-sighted harvesting behavior. Previous experience with scarcity events, while not a phenomenon that can be controlled by policy-makers, has also been suggested, by previous research, as a possible positive factor in the emergence of cooperative behavior. This once again stresses the importance of communication and information transmission among the users.

As a conclusion to this review, it is important to highlight that, while the insight coming from experimental research in environmental economic has been able to pinpoint some very relevant aspects to the management of the Commons, which should be considered when developing policies, it is also crucial to remember that, as stated by Ostmann (1998, 119):

There are important categorical differences between the researcher's model of a common, the real world phenomenon, and the experimental situation that the subjects have to deal with. Acknowledging these differences we have to admit that no direct conclusions (...) can be drawn from experimental results.

This strong statement raises a very critical point, and reminds us that each approach, and in particular the experimental approach, comes with trade-offs. Researchers, and policy-makers to an even high degree, should always be very wary of extending results to a field, situation, environment, or society different from the ones they were obtained in. Undeniably, then, the high degree of complexity of each and every real-world scenario will need critical thinking, in-depth analysis, and reliance on multiple methods and approaches to develop effective strategies.

Literature

- Allison, S. T., McQueen, L. R., & Schaerfl, L. M. 1992. Social Decision Making Processes and the Equal Partitionment of Shared Resources. *Journal of Experimental Social Psychology*, 28(1), 23–42.
- Andreoni, J. 1995. Cooperation in Public-Goods Experiments: Kindness or Confusion?. *The American Economic Review*, 85(4), 891–904.
- Apesteguia, J. & Maier-Rigaud, P. 2006. The Role of Rivalry: Public Goods Versus Common-Pool Resources. *Journal of Conflict Resolution*, 50(5), 646–63.
- Bargh, J. & Chartrand, T. 1999. The Unbearable Automaticity of Being. *American psychologist*, 54(7), 462–479.
- Blanco, E., Lopez, M., & Villamayor-Tomás, S. 2011. Does Water Scarcity Lead to Overuse? Evidence from Field Experiments. *Working Paper*, W11–15, Indiana University.

- Blanco, E., Lopez, M., & Villamayor-Tomas, S. 2015. Exogenous Degradation in the Commons: Field Experimental Evidence. *Ecological Economics*, 120, 430–9.
- Brandstätter, E., Gigerenzer, G., & Hertwig, R. 2006. The Priority Heuristic: Making Choices Without Trade-offs. *Psychological Review*, 113(2), 409–32.
- Brosig, J., Weimann, J., & Ockenfels, A. 2003. The Effect of Communication Media on Cooperation. *German Economic Review*, 4(2), 217–241.
- Bru, L., Cabrera, S., Capra, C., & Gomez, R. 2003. A Common Pool Resource Game With Sequential Decisions and Experimental Evidence. *Experimental Economics*, 114, 91–114.
- Budescu, D., Rapoport, A., & Suleiman, R. 1990. Resource Dilemmas With Environmental Uncertainty and Asymmetric Players. *European Journal of Social Psychology*, 20, 475–87.
- Croson, R. T. a. & Marks, M. B. 2000. Step Returns in Threshold Public Goods: A Meta- and Experimental Analysis. *Experimental Economics*, 2(3), 239–59.
- Dannenberg, A., Löschel, A., Paolacci, G., Reif, C., & Tavoni, A. 2011. Coordination Under Threshold Uncertainty In a Public Goods Game. *ZEW Discussion Papers*, 11-065.
- El-Gamal, M. & Grether, D. 1995. Are People Bayesian? Uncovering Behavioral Strategies. *Journal of the American Statistical Association*, 90(432), 1137–45.
- Fischbacher, U., Gächter, S., & Fehr, E. 2001. Are People Conditionally Cooperative? Evidence from a Public Goods Experiment. *Economics Letters*, 71, 397–404.
- Folke C, Carpenter S, Walker B, Scheffer M, Elmqvist T, Gunderson L, & Holling C. S. 2004. Regime Shifts, Resilience, and Biodiversity in Ecosystem Management. *Annual Review of Ecology, Evolution and Systematics*, 35, 557–581.
- Gigerenzer, G. & Goldstein, D. G. 1996. Reasoning the Fast and Frugal Way: Models of Bounded Rationality. *Psychological Review*, 103(4), 650–669.
- Gigerenzer, G. 2008. *Rationality for Mortals: How People Cope With Uncertainty*. New York: Oxford University Press.
- Gigerenzer, G. & Brighton, H. 2009. Homo Heuristicus: Why Biased Minds Make Better Inferences. *Topics in Cognitive Science*, 1(1), 107–143.
- Gintis, H. 2000. *Game Theory Evolving: A Problem-Centered Introduction to Modeling Strategic Interaction*. Princeton, NJ: Princeton University Press.
- Gunthorsdottir, A., Houser, D., & McCabe, K. 2007. Disposition, History and Contributions in Public Goods Experiments. *Journal of Economic Behavior & Organization*, 62(2), 304–315.

- Hackett, S., Schlager, E., & Walker, J. 1994. The Role of Communication in Resolving Commons Dilemmas: Experimental Evidence with Heterogeneous Appropriators. *Journal of Environmental Economics and Management*, 27, 99–126.
- Hardin, G. 1968. The Tragedy of the Commons. *Science*, 162(5364), 1243–8.
- Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., McElreath, R., Alvard, M., Barr, A., Ensminger, J., Henrich, N.S., Hill, K., Gil-White, F., Gurven, M., Marlowe, F. W., Patton, J. Q., & Tracer, D., 2005. “Economic Man” in cross-cultural Perspective: Behavioral Experiments in 15 Small-Scale Societies. *Behavioral and Brain Sciences*, 28(06), 1–62.
- Janssen, M. A., Holahan, R., Lee, A., & Ostrom, E. 2010. Lab Experiments for the Study of Social-Ecological Systems. *Science*, 328(5978), 613–7.
- Kahneman, D. & Tversky, A. 1979. Prospect Theory: An Analysis of Decision Under Risk. *Econometrica: Journal of the Econometric Society*, 47(March), 263–291.
- Kollock, P. 1998. Social Dilemmas: The Anatomy of Cooperation. *Annual Review Of Sociology*, 24(1), 183.
- March, J. 1994. *A Primer On Decision-Making: How Decisions Happen*. New York: Free Press.
- March, J. & Olsen, J. 2004. The Logic of Appropriateness. in M. Moran, M. Rein, & R. E. Goodin (eds) *The Oxford Handbook of Public Policy*. Oxford: Oxford University Press, pp. 689–708.
- Margreiter, M., Sutter, M., & Dittrich, D. 2005. Individual and Collective Choice and Voting in Common Pool Resource Problem with Heterogeneous Actors. *Environmental and Resource Economics*, 32, 241–271.
- Marwell, G. & Ames, R. 1980. Experiments on the Provision of Public Goods. II. Provision Points, Stakes, Experience, and the Free-Rider Problem. *American Journal of Sociology*, 85(4), 926–937.
- McAllister, R. R. J., Tisdell, J. G., Reeson, A. F., & Gordon, I. J. 2011. Economic Behavior in the Face of Resource Variability and Uncertainty. *Ecology and Society*, 16(3).
- Milinski, M., Semmann, D., & Krambeck, H.-J. 2002. Reputation Helps Solve the “tragedy of the commons”. *Nature*, 415(6870), 424–6.
- Milinski, M., Sommerfeld, R. D., Krambeck, H.-J., Reed, F. a, & Marotzke, J. 2008. The Collective-Risk Social Dilemma and the Prevention of Simulated Dangerous Climate Change. *Proceedings of the National Academy of Sciences of the United States of America*, 105(7), 2291–4.
- Ostmann, A. 1998. External Control May Destroy the Commons. *Rationality and Society*, 10, 103–122.
- Ostrom, E. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.

- Ostrom, E., Walker, J., & Gardner, R. 1992. Covenants With and Without a Sword: Self-Governance Is Possible. *The American Political Science Review*, 86(2), 404–417.
- Ostrom, E., Gardner, R., Walker, J. 1994. *Rules, Games & Common-Pool Resources*. Ann Arbor: The University of Michigan Press.
- Ostrom, E. 1998. A Behavioral Approach to the Rational Choice Theory of Collective Action. *American Political Science Review*, 92(1), 1–22.
- Ostrom, E. 2009. A General Framework for Analyzing Sustainability of Social-Ecological Systems. *Science*, 325(5939), 419–422.
- Osés-Eraso, N., Udina, F., & Viladrich-Grau, M. 2007. Environmental versus Human-Induced Scarcity in the Commons: Do They Trigger the Same Response?. *Environmental and Resource Economics*, 40(4), 529–550.
- Osés-Eraso, N. & Viladrich-Grau, M. 2007. Appropriation and Concern for Resource Scarcity in the Commons: An Experimental Study. *Ecological Economics*, 63(2-3), 435–445.
- Poteete, A., Janssen, M., & Ostrom, E. 2010. *Working Together: Collective Action, the Commons, and Multiple Methods in Practice*. Princeton: Princeton University Press.
- Rockenbach, B. & Milinski, M. 2006. The Efficient Interaction of Indirect Reciprocity and Costly Punishment. *Nature*, 444(7120), 718–23.
- Samuelson, C. & Allison, S. T. 1992. Social Decision Heuristics, Role Schemas, and the Consumption of Shared Resources. *Journal of experimental social psychology*, 28, 23–42.
- Samuelson, C. & Allison, S. 1994. Cognitive Factors Affecting the Use of Social Decision Heuristics in Resource-Sharing Tasks. *Organizational Behavior and Human Decision Processes*, 58, 1–27.
- Schill, C., Lindahl, T., & Crépin, A. 2015. Collective Action and the Risk of Rcosystem Regime Shifts: Insights from a Laboratory Experiment. *Ecology and Society*, 20(1).
- Simon, H. A. 1955. A Behavioral Model of Rational Choice. *The Quarterly Journal of Economics*, 69(1), 99–118.
- Simon, H. A. 1983. *Reason in Human Affairs*. Stanford: Stanford University Press.
- Sutter, M., Haigner, S., & Kocher, M. 2010. Choosing the Carrot or the Stick? Endogenous Institutional Choice in Social Dilemma Situations. *Review of Economic Studies*, 77 (4), 1540–66.
- Tavoni, A., Dannenberg, A., Kallis, G., & Löschel, A. 2011. Inequality, Communication, and the Avoidance of Disastrous Climate Change in a Public Goods Game. *Proceedings of the National Academy of Sciences of the United States of America*, 108(29), 11825–9.
- Weber, J. M., Kopelman, S., & Messick, D. M. 2004. A Conceptual Review of Decision Making in Social Dilemmas: Applying a Logic of Appropriateness. *Personality and Social Psychology Review*, 8(3), 281–307.

- Wit, A. & Wilke, H. 1998. Public Good Provision Under Environmental and Social Uncertainty. *European Journal of Social Psychology*, 256, 249–256.
- Yami, M., Vogl, C., & Hauser, M. 2009. Comparing the Effectiveness of Informal and Formal Institutions in Sustainable Common Pool Resources Management in Sub-Saharan Africa. *Conservation and Society*, 7(3), 153–164.

Nicola Cerutti
(Jacobs University, Bremen, nicola.cerutti@zmt-bremen.de)

Social Dilemmas in Environmental Economics: A review

Abstract.

Many crucial environmental issues lead to social dilemmas, in which the personally optimal solution, and the socially optimal solution diverge. Finding a solution to this dilemma is extremely important to allow a good and sustainable management of many exhaustible natural resources. This is especially true when the resource users need to develop collectively a set of rules or practices, and the institutions are unable to provide, or enforce, effective regulations. A few examples are forests, and fisheries, but also carbon emissions. This review presents a selected number of results coming from field observations, laboratory experiments, and theoretical work, which pinpoint some of the more crucial aspects of these decision environments. Knowing which incentives and situational aspects may motivate resource users to adopt a more or less cooperative behavior can potentially be of pivotal importance to develop effective policies and regulations. At the same time, the research we present is also of great interest for any diagnostic or explorative study that aims to study direct resource users, and their development of cooperative attitudes and practices.

Keywords: Decision theory, environmental economics, social dilemmas, resources, experiments.

Ethics in Progress (ISSN 2084-9257). Vol. 8 (2017). No. 1, Art. #10, pp. 156-173.

Creative Commons BY-SA 3.0

Doi: 10.14746/eip.2017.1.10