

null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "pad":
 "AAAAAAAAAAAAAAAAAAAAAAAAAAAA", "parent_id": "8172907d-e30d-459e-8576-0b69bc5df570",
 "request_id": "87efefal58d60e2a-MXP", "timestamp_": "absolute", "recipient": "all",
 "channel": null}, "parent": "8172907d-e30d-459e-8576-0b69bc5df570", "children":
 [{"id": "4f8097be-de5a-4aa8-ac7c-4198c61fd72b"}], "4f8097be-de5a-4aa8-ac7c-4198c61fd72b":
 {"id": "4f8097be-de5a-4aa8-ac7c-4198c61fd72b", "message": {"id": "4f8097be-de5a-4aa8-
 ac7c-4198c61fd72b", "author": {"role": "assistant", "name": null, "metadata": {}},
 "create_time": 1714903813.276887, "update_time": null, "content": {"content_type":
 "text", "parts": ["Here are some studies that discuss the effectiveness of community
 groups in managing local issues, supporting the idea that local control can lead to
 improvements:\n\n1. **Mesch and Schwirian (1996)** investigated neighborhood
 organizations and found that effectiveness in protecting and improving local
 environments through collective action is influenced by organizational resources and
 community engagement. Their findings suggest that active local groups can indeed
 manage their affairs effectively, particularly when they have access to sufficient
 resources and are embedded in supportive coalitions ([Mesch & Schwirian,
 1996] (https://consensus.app/papers/effectiveness-neighborhood-collective-action-mesch/930cd754c082504cb3362aeb4fd761c3/?utm_source=chatgpt)).\n\n2. **Liu et al.
 (2020)** explored collective action in rural Chinese villages experiencing
 depopulation and found that community-based collective action effectively managed
 local environmental issues through leadership and a focus on collective benefits. This
 study highlights the importance of community organization in maintaining sustainable
 local management systems ([Liu, Zhao, Ravenscroft, & Harder,
 2020] (https://consensus.app/papers/responsibilitydriven-action-context-depopulation-liu/aac019f0944a589e98e6c8ff7eb0b18a/?utm_source=chatgpt)).\n\n3. **Mara-Eves
 et al. (2015)** conducted a meta-analysis on community engagement in public health
 interventions and found that active community participation was linked to improved
 health outcomes and reduced health inequities, supporting the role of community groups
 in effectively managing issues that impact them directly ([Mara-Eves et al.,
 2015] (https://consensus.app/papers/effectiveness-community-health-interventions-omaraeves/402f40ee3ee552e295da4f405108f4ca/?utm_source=chatgpt)).\n\nThese studies
 support the notion that community groups, when effectively organized and resourced,
 can have a significant positive impact on local issues, suggesting that transferring
 control of community issues to local groups can lead to improvements."}], "status":
 "finished_successfully", "end_turn": true
 , "weight": 1.0, "metadata": {"finish_details": {"type": "stop", "stop_tokens":
 [100260]}, "citations": [], "gizmo_id": "g-bo0FiWLY7", "is_complete": true,
 "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "pad":
 "AA", "parent_id": "69dd4084-8a34-4a1f-8adf-dbb6b8076305", "request_id":
 "87efefal58d60e2a-MXP", "timestamp_": "absolute", "recipient": "all", "channel":
 null}, "parent": "69dd4084-8a34-4a1f-8adf-dbb6b8076305", "children": [{"id": "aaa2ce46-0552-
 4dd4-a09d-3b4539d3296e"}], "aaa2ce46-0552-4dd4-a09d-3b4539d3296e": {"id": "aaa2ce46-
 0552-4dd4-a09d-3b4539d3296e", "message": {"id": "aaa2ce46-0552-4dd4-a09d-3b4539d3296e",
 "author": {"role": "user", "name": null, "metadata": {}}, "create_time":
 1714905510.135059, "update_time": null, "content": {"content_type": "text", "parts":
 ["are capital resources the same as capital or money? How should I state this better:
 However, not to beat a dead horse, but in the capitalist system of today, the issue of
 distributing the capital resource, capital, equitable community governance on a large
 scale is unlikely. We need to get rid of capitalism and move towards a more

cooperative system for managing resources."}], "status": "finished_successfully", "end_turn": null, "weight": 1.0, "metadata": {"request_id": "87f019eb5a6b374f-MXP", "timestamp_": "absolute", "message_type": null}, "recipient": "all", "channel": null}, "parent": "4f8097be-de5a-4aa8-ac7c-4198c61fd72b", "children": ["9ff5c005-2937-4596-8489-bbafc7891521"]], "9ff5c005-2937-4596-8489-bbafc7891521": {"id": "9ff5c005-2937-4596-8489-bbafc7891521", "message": {"id": "9ff5c005-2937-4596-8489-bbafc7891521", "author": {"role": "assistant", "name": null, "metadata": {}}, "create_time": 1714905532.588936, "update_time": null, "content": {"content_type": "text", "parts": ["Capital resources and capital or money are related but distinct concepts in economics and business. **Capital resources** refer to the assets\u2014such as buildings, machinery, and equipment\u2014used by a business to produce goods and services. These are often referred to as 'physical capital.' On the other hand, **capital** in the context of finance typically refers to money that businesses use to fund their operations, including investments and expenditures. This can include the funds used to purchase capital resources.\n\nTo clarify and refine your statement about the distribution of resources in a capitalist system, you might consider stating it like this:\n\n'However, revisiting a well-discussed issue, the current capitalist system faces significant challenges in equitably distributing capital resources. In such a system, community governance on a large scale tends to be ineffective. Moving toward a cooperative system could potentially offer a more equitable management of both capital and resources, aligning better with community-wide interests.'\n\nThis revision removes the colloquial phrase 'not to beat a dead horse,' which might detract from the formal tone typically used in discussing economic systems. It also clarifies the types of capital being discussed, helping to distinguish between financial resources and physical assets."}], "status": "finished_successfully", "end_turn": true, "weight": 1.0, "metadata": {"finish_details": {"type": "stop", "stop_tokens": [100260]}, "citations": [], "gizmo_id": "g-bo0FiWLY7", "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "pad": "AAAAAAAAAAAAAAAAAAAA", "parent_id": "aaa2ce46-0552-4dd4-a09d-3b4539d3296e", "is_complete": true, "request_id": "87f019eb5a6b374f-MXP", "timestamp_": "absolute"}, "recipient": "all", "channel": null}, "parent": "aaa2ce46-0552-4dd4-a09d-3b4539d3296e", "children": ["aaa21312-9ec7-4857-92b1-caf6a0edb453"]], "aaa21312-9ec7-4857-92b1-caf6a0edb453": {"id": "aaa21312-9ec7-4857-92b1-caf6a0edb453", "message": {"id": "aaa21312-9ec7-4857-92b1-caf6a0edb453", "author": {"role": "user", "name": null, "metadata": {}}, "create_time": 1714905673.655648, "update_time": null, "content": {"content_type": "text", "parts": ["I was talking about the distribution and management of resources in a capitalist system and saying that often financial resources (money) are inequitably spread and so moving away from capitalism toward cooperatism to manage human resources is the way."}], "status": "finished_successfully", "end_turn": null, "weight": 1.0, "metadata": {"request_id": "87f01de7becc0e3e-MXP", "timestamp_": "absolute", "message_type": null}, "recipient": "all", "channel": null}, "parent": "9ff5c005-2937-4596-8489-bbafc7891521", "children": ["58433485-6e14-479a-98d7-1398669cd25c"]], "58433485-6e14-479a-98d7-1398669cd25c": {"id": "58433485-6e14-479a-98d7-1398669cd25c", "message": {"id": "58433485-6e14-479a-98d7-1398669cd25c", "author": {"role": "assistant", "name": null, "metadata": {}}, "create_time": 1714905688.665095, "update_time": null, "content": {"content_type": "text", "parts": ["Thank you for clarifying your focus. Given this context, you can revise your statement to better address the inequitable distribution of financial resources and the benefits of a cooperative system for managing human"]

resources. Here's a refined version of your statement:

"However, revisiting a critical issue, the capitalist system as it stands today struggles with the equitable distribution of financial resources. This inequity often hinders effective community governance on a large scale. Transitioning away from capitalism towards a cooperative system could provide a more equitable and effective framework for managing both financial and human resources, aligning more closely with the needs of the community."

This version explicitly mentions financial resources to clarify that the focus is on the distribution of money, and it suggests that a cooperative system might better manage both financial and human resources, thus addressing the core issues more directly."}], "status":

"finished_successfully", "end_turn": true
, "weight": 1.0, "metadata": {"finish_details": {"type": "stop", "stop_tokens": [100260]}, "citations": [], "gizmo_id": "g-bo0FiWLY7", "is_complete": true, "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "pad": "AAAAAAA", "parent_id": "aaa21312-9ec7-4857-92b1-caf6a0edb453", "request_id": "87f01de7becc0e3e-MXP", "timestamp": "absolute"}, "recipient": "all", "channel": null}, "parent": "aaa21312-9ec7-4857-92b1-caf6a0edb453", "children": []}}, "moderation_results": [], "current_node": "58433485-6e14-479a-98d7-1398669cd25c", "plugin_ids": null, "conversation_id": "61f6e153-a34f-4813-971c-dfb07ba2290b", "conversation_template_id": "g-bo0FiWLY7", "gizmo_id": "g-bo0FiWLY7", "is_archived": false, "safe_urls": ["https://consensus.app/papers/main-challenges-involved-adoption-manufacturing-tanco/a5c789a72fe257aca54ec3d78eb4e97a/?utm_source=chatgpt", "https://consensus.app/papers/modeling-industry-adoption-production-micro-small-medium-khanzode/ef7d99031c4f5ed5997291e3b79fe75d/?utm_source=chatgpt", "https://consensus.app/papers/what-drivers-barriers-business-practice-adoption-smes-purwandani/72bcd623af25446ac586bf73f7d267d/?utm_source=chatgpt", "https://consensus.app/papers/cleaning-water-building-community-community-watershed-stedman/88dbdc7fadb65669aba9972505e621be/?utm_source=chatgpt", "https://consensus.app/papers/responsibilitydriven-action-context-depopulation-liu/aac019f0944a589e98e6c8ff7eb0b18a/?utm_source=chatgpt", "https://consensus.app/papers/effectiveness-neighborhood-collective-action-mesch/930cd754c082504cb3362aeb4fd761c3/?utm_source=chatgpt", "https://consensus.app/papers/managing-entity-business-organizations-understanding-kirkman/1b2447c8720e5a048e2a7924e31df362/?utm_source=chatgpt", "https://consensus.app/papers/role-small-businesses-sustainability-ibrahim/ea48b8fc02f15f4a8e62deb6dc11b361/?utm_source=chatgpt", "https://consensus.app/papers/formation-community-practice-watershed-scale-integrated-kitamura/a7f5600f682b5964a35895dc49006bda/?utm_source=chatgpt", "https://consensus.app/papers/advancing-policy-change-living-collaboratives-litt/76cf6a7486cd5c4592f2599961c3bfe0/?utm_source=chatgpt", "https://consensus.app/papers/untangling-origins-commitment-insights-small-firms-cantele/70340ab3e3be589797d6f8ddfe9bba26/?utm_source=chatgpt", "https://consensus.app/papers/community-groups-maps-geographic-information-craig/b7b4aff8cd585a588db301024f516e9e/?utm_source=chatgpt", "https://consensus.app/papers/legitimacy-strategy-resources-survival-communitybased-walker/dbd55226cddc5672b642aab6a975cc2f/?utm_source=chatgpt", "https://consensus.app/papers/sustainability-practices-smes-case-lawrence/7e271caald9b5c0a86b9cca868ea5a3a/?utm_source=chatgpt", "https://consensus.app/papers/amenity-equity-review-local-environmental-pressure-

lowe/b1c0e38e607a5dc384a8c8a8051fd9e0/?utm_source=chatgpt",
"https://consensus.app/papers/sustainability-thinking-business-kopnina/b584454101df51f09de03760a578a74e/?utm_source=chatgpt",
"https://consensus.app/papers/teacher-work-group-effectiveness-conley/26a10eed70705506b0960f66200789a1/?utm_source=chatgpt",
"https://consensus.app/papers/leaping-innovation-barriers-business-longevity-taneja/49be6eb95af55a619911eebfff6e398d0/?utm_source=chatgpt",
"https://consensus.app/papers/insertion-sustainable-practices-small-mediumsized-junior/1756003bbc3c58d08057f6f53b7446a2/?utm_source=chatgpt",
"https://consensus.app/papers/fostering-sustainability-sourcing-businesses-sector-walker/1fde37f70ecb55c5abdb33771dd0a93e/?utm_source=chatgpt",
"https://consensus.app/papers/entrepreneurship-role-perceived-barriers-risk-hoogendoorn/1c2519dd4cb653ceafbbce4029589b69/?utm_source=chatgpt",
"https://consensus.app/papers/problemsolving-strategies-local-areas-metropolis-guest/79f5e70d5ac85eab9d1fac6c0d0bd8c5/?utm_source=chatgpt",
"https://consensus.app/papers/changing-effectiveness-local-civic-action-critical-nexus-longhofer/61e89f47282557359216d4f87fd68ee0/?utm_source=chatgpt",
"https://consensus.app/papers/lack-crossscale-linkages-reduces-robustness-cudneybueno/6c5f4163421759d584cb062be083ebb5/?utm_source=chatgpt",
"https://consensus.app/papers/community-relations-issues-management-issue-orientation-berkowitz/b2ac43d7fbad5eb5b1000c647d969c09/?utm_source=chatgpt",
"https://consensus.app/papers/barriers-adoption-industry-sustainability-case-study-kumar/4340632057195da6b53623be7411534f/?utm_source=chatgpt",
"https://consensus.app/papers/exploring-drivers-barriers-sustainability-business-aghelie/b58cd7a1a1845a089531b643334f6f35/?utm_source=chatgpt",
"https://consensus.app/papers/research-progress-quantum-memory-jianpeng/b3cd120d55a75662ad2196a958197814/?utm_source=chatgpt",
"https://consensus.app/papers/evaluation-three-democratic-communitybased-approaches-carr/1f271d5d95235588a23f263beb21c25f/?utm_source=chatgpt",
"https://consensus.app/papers/exploring-characteristics-business-practice-caldera/8c360ab39a685aebac95ea4b07ed0492/?utm_source=chatgpt",
"https://consensus.app/papers/barriers-sustainability-medium-enterprises-framework-jaramillo/7ddc170d86fb5598b86e2d90b607056c/?utm_source=chatgpt",
"https://consensus.app/papers/barriers-practices-small-health\u2010care-facilities-case-chukevin/0e155db093be5d17afe9817f12d0e0e6/?utm_source=chatgpt",
"https://consensus.app/papers/management-economically-business-gotschol/d2a8a9781bc15325a800d01eb3cd4659/?utm_source=chatgpt",
"https://consensus.app/papers/relations-frail-contacts-failing-demands-community-wilde/92a090cda4ac50ee91ec3d7032b47756/?utm_source=chatgpt",
"https://consensus.app/papers/social-capital-competent-communities-role-community-campbell/feadc2cf93ce538589e11240eafc9c2f/?utm_source=chatgpt",
"https://consensus.app/papers/citizen-participation-neighborhood-organizations-poor-ohmer/cfcca786b35b57629fb98436e65330d1/?utm_source=chatgpt",
"https://consensus.app/papers/examination-barriers-that-impact-implementation-mcewen/3d3c1d9d5a6b5c21a237b00b21c8fd74/?utm_source=chatgpt",
"https://consensus.app/?utm_source=chatgpt", "https://consensus.app/papers/evaluating-enablers-barriers-implementation-business-caldera/613bfd27b8215781b62515c9e530819d/?utm_source=chatgpt",
"https://consensus.app/papers/community-organizing-practice-research-policy-

```

christens/2c8eea3f71dc53459e92acead19b6c73/?utm_source=chatgpt",
"https://consensus.app/papers/effectiveness-community-health-interventions-omaraeves/402f40ee3ee552e295da4f405108f4ca/?utm_source=chatgpt",
"https://consensus.app/papers/business-models-china-birkin/d909b67aa1fb5c00a28da15fd06f6e2c/?utm_source=chatgpt"], "default_model_slug":
"gpt-4", "conversation_origin": null, "voice": null, "async_status": null, "id":
"61f6e153-a34f-4813-971c-dfb07ba2290b"}, {"title": "Sustainable Material Costs",
"create_time": 1714879196.005852, "update_time": 1714880200.065289, "mapping":
{"ebdd4333-0cfa-47a8-acaf-cdlb52018b39": {"id": "ebdd4333-0cfa-47a8-acaf-cdlb52018b39",
"message": {"id": "ebdd4333-0cfa-47a8-acaf-cdlb52018b39", "author": {"role": "system",
"name": null, "metadata": {}}, "create_time": null, "update_time": null, "content":
{"content_type": "text", "parts": [""], "status": "finished_successfully", "end_turn":
true
, "weight": 0.0, "metadata": {"is_visually_hidden_from_conversation": true},
"recipient": "all", "channel": null}, "parent": "aaa127fb-eea3-4307-b29b-56cd5ae00364",
"children": ["aaa287a1-bbd3-4d84-be4d-bd34c139b3b3"]}, "aaa127fb-eea3-4307-b29b-
56cd5ae00364": {"id": "aaa127fb-eea3-4307-b29b-56cd5ae00364", "message": null,
"parent": null, "children": ["ebdd4333-0cfa-47a8-acaf-cdlb52018b39"]}, "aaa287a1-bbd3-
4d84-be4d-bd34c139b3b3": {"id": "aaa287a1-bbd3-4d84-be4d-bd34c139b3b3", "message":
{"id": "aaa287a1-bbd3-4d84-be4d-bd34c139b3b3", "author": {"role": "user", "name": null,
"metadata": {}}, "create_time": 1714879196.007732, "update_time": null, "content":
{"content_type": "text", "parts": ["is it cheaper for Pela case to use sustainable
materials? "], "status": "finished_successfully", "end_turn": null, "weight": 1.0,
"metadata": {"request_id": "87ed977dae653762-MXP", "timestamp_": "absolute",
"message_type": null}, "recipient": "all", "channel": null}, "parent": "ebdd4333-0cfa-
47a8-acaf-cdlb52018b39", "children": ["2f93f0e4-a081-4bcb-8fcc-d2c5253299bc"]},
"2f93f0e4-a081-4bcb-8fcc-d2c5253299bc": {"id": "2f93f0e4-a081-4bcb-8fcc-d2c5253299bc",
"message": {"id": "2f93f0e4-a081-4bcb-8fcc-d2c5253299bc", "author": {"role":
"assistant", "name": null, "metadata": {}}, "create_time": 1714879218.283829,
"update_time": null, "content": {"content_type": "text", "parts": ["Pela Case is known
for its environmentally friendly phone cases made primarily from a compostable
bioplastic material derived from plants. As for whether it is cheaper to use these
sustainable materials compared to conventional plastics, several factors come into
play.\n\n1. Cost of Materials: Sustainable materials, such as the bioplastics used
by Pela, can be more expensive than conventional plastics. Traditional plastics are
often derived from petroleum, which is typically more cost-efficient due to
established supply chains and economies of scale.\n\n2. Manufacturing Processes:
The production processes for sustainable materials can also be more costly. They may
require different machinery or less efficient processes because they are not produced
at the same scale as conventional plastics.\n\n3. Economies of Scale: Since
sustainable materials are generally less common, they lack the economies of scale that
help reduce the cost of more widely used materials. However, as demand for eco-
friendly products increases, these costs may decrease.\n\n4. Long-term Costs and
Savings: Companies like Pela might also consider the long-term financial benefits of
using sustainable materials, such as enhanced brand loyalty, the ability to market
products as eco-friendly, and potential subsidies or tax benefits for using greener
materials.\n\nOverall, while the initial costs for sustainable materials might be
higher, the long-term benefits and company values geared towards sustainability play a
crucial role in such decisions. Pela Case, for example, prioritizes environmental

```

impact, which aligns with their brand identity and customer base, even if the immediate costs are higher."}], "status": "finished_successfully", "end_turn": true, "weight": 1.0, "metadata": {"finish_details": {"type": "stop", "stop_tokens": [100260]}}, "citations": [], "gizmo_id": null, "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "pad": "AAAAAAAAAAAAAAAAAAAA", "parent_id": "aaa287a1-bbd3-4d84-be4d-bd34c139b3b3", "request_id": "87ed977dae653762-MXP", "timestamp": "absolute", "is_complete": true}, "recipient": "all", "channel": null}, {"parent": "aaa287a1-bbd3-4d84-be4d-bd34c139b3b3", "children": [{"id": "aaa278d0-6138-4272-b6d2-77aa3c83f338"}], "aaa278d0-6138-4272-b6d2-77aa3c83f338": {"id": "aaa278d0-6138-4272-b6d2-77aa3c83f338", "message": {"id": "aaa278d0-6138-4272-b6d2-77aa3c83f338", "author": {"role": "user", "name": null, "metadata": {}}, "create_time": 1714879332.366462, "update_time": null, "content": {"content_type": "text", "parts": ["I heard they have are a certified b organization. What sort of standards do they need to make them a? "]}}, "status": "finished_successfully", "end_turn": null, "weight": 1.0, "metadata": {"request_id": "87ed9acfaf730e5d-MXP", "timestamp": "absolute", "message_type": null}, "recipient": "all", "channel": null}, {"parent": "2f93f0e4-a081-4bcb-8fcc-d2c5253299bc", "children": [{"id": "ae148d71-5e83-49c0-bbca-398a358882ba"}], "ae148d71-5e83-49c0-bbca-398a358882ba": {"id": "ae148d71-5e83-49c0-bbca-398a358882ba", "message": {"id": "ae148d71-5e83-49c0-bbca-398a358882ba", "author": {"role": "assistant", "name": null, "metadata": {}}, "create_time": 1714879358.732049, "update_time": null, "content": {"content_type": "text", "parts": ["B Corporation certification is awarded to companies that meet high standards of social and environmental performance, accountability, and transparency. This certification is provided by B Lab, a nonprofit organization. To become a certified B Corporation, a company must go through a rigorous assessment process that evaluates several aspects of its operations and business model. Here are the key areas evaluated:\n\n1. **Environmental Performance**: The company\u2019s impact on the environment, including resource use, energy use, waste, and emissions. Companies must demonstrate responsible management of their environmental footprint.\n\n2. **Social Performance**: How the company treats its employees, the benefits it offers, and its contribution to the community. This also includes supplier and vendor relations, as well as consideration for customer health and safety.\n\n3. **Governance**: Transparency and accountability in business practices. This includes the company's mission, ethics, accountability to stakeholders, and transparency in reporting these practices.\n\n4. **Workers**: The assessment considers compensation, benefits, training, ownership opportunities, management practices, and work environment. Companies must show that they treat employees fairly and with respect.\n\n5. **Customers**: The impact of the company\u2019s products or services on its customers. This includes issues like privacy, data security, and the overall impact of products on customer well-being.\n\nTo maintain their B Corp certification, companies must also undergo verification every three years to ensure they continue to meet these standards and sometimes must achieve a minimum score on the B Impact Assessment.\n\nBy meeting these standards, companies like Pela Case demonstrate a commitment to not just being the best in the world, but being the best for the world, aligning profit motives with the broader social and environmental concerns."]}}, "status": "finished_successfully", "end_turn": true, "weight": 1.0, "metadata": {"finish_details": {"type": "stop", "stop_tokens": [100260]}}, "citations": [], "gizmo_id": null, "is_complete": true, "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "pad": "AAAAAAA",

```

"parent_id": "aaa278d0-6138-4272-b6d2-77aa3c83f338", "request_id": "87ed9acfaf730e5d-MXP", "timestamp_": "absolute", "recipient": "all", "channel": null}, "parent": "aaa278d0-6138-4272-b6d2-77aa3c83f338", "children": ["aaa20c16-246e-4187-925c-d205cdea1945"]}, "aaa20c16-246e-4187-925c-d205cdea1945": {"id": "aaa20c16-246e-4187-925c-d205cdea1945", "message": {"id": "aaa20c16-246e-4187-925c-d205cdea1945", "author": {"role": "user", "name": null, "metadata": {}}, "create_time": 1714879390.704302, "update_time": null, "content": {"content_type": "text", "parts": ["are there other certifications they could get? "]}}, "status": "finished_successfully", "end_turn": null, "weight": 1.0, "metadata": {"request_id": "87ed9c38fb360e5d-MXP", "timestamp_": "absolute", "message_type": null}, "recipient": "all", "channel": null}, "parent": "aef148d71-5e83-49c0-bbca-398a358882ba", "children": ["f9b26b9f-f87a-41be-aafb-5f9bc2823929"]}, "f9b26b9f-f87a-41be-aafb-5f9bc2823929": {"id": "f9b26b9f-f87a-41be-aafb-5f9bc2823929", "message": {"id": "f9b26b9f-f87a-41be-aafb-5f9bc2823929", "author": {"role": "assistant", "name": null, "metadata": {}}, "create_time": 1714879419.993979, "update_time": null, "content": {"content_type": "text", "parts": ["Yes, aside from B Corporation certification, there are several other certifications that companies like Pela Case, which prioritize sustainability and ethical business practices, might consider obtaining. These certifications can help validate their efforts in various specific areas of environmental and social responsibility:\n\n1. Green Seal or EcoLogo: These certifications focus on the environmental impacts of products. They evaluate a product's life cycle from manufacturing to disposal to ensure it meets stringent environmental performance standards.\n\n2. Fair Trade Certification: This is applicable to companies that source materials or products. Fair Trade certification ensures that producers receive fair prices and wages, work in safe conditions, and engage in environmentally friendly practices.\n\n3. Cradle to Cradle Certified: This certification assesses products across five quality categories: material health, material reutilization, renewable energy and carbon management, water stewardship, and social fairness. It's designed for companies looking to design products with a positive impact on people and the planet.\n\n4. LEED Certification: Relevant for companies with physical locations, LEED (Leadership in Energy and Environmental Design) certifies buildings that are resource-efficient, use less water and energy, and reduce greenhouse gas emissions.\n\n5. Climate Neutral Certification: This certification is awarded to companies that have measured and offset all of their greenhouse gas emissions and are working to reduce future emissions.\n\n6. Energy Star: For companies that produce electronic products or use significant energy in their operations, achieving Energy Star certification shows they meet strict energy efficiency guidelines set by the U.S. Environmental Protection Agency.\n\n7. Forest Stewardship Council (FSC) Certification: Relevant for companies that use paper or wood products, this certification ensures that the products come from responsibly managed forests that provide environmental, social, and economic benefits.\n\nEach of these certifications has its own specific focus and standards, and obtaining them can help a company like Pela Case demonstrate its commitment to various aspects of sustainability and ethical business practices. These certifications not only help in improving internal practices but also in communicating trust and commitment to customers and stakeholders."]}}, "status": "finished_successfully", "end_turn": true, "weight": 1.0, "metadata": {"finish_details": {"type": "stop", "stop_tokens": [100260]}, "citations": [], "gizmo_id": null, "is_complete": true, "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "pad":

```

```
"AAAAAAAAAAAAAAAAAAAA", "parent_id": "aaa20c16-246e-4187-925c-d205cdea1945",  
"request_id": "87ed9c38fb360e5d-MXP", "timestamp_": "absolute", "recipient": "all",  
"channel": null}, "parent": "aaa20c16-246e-4187-925c-d205cdea1945", "children":  
["aaa2ef0d-fae0-48a4-b4d9-657712917c2a"]}, "aaa2ef0d-fae0-48a4-b4d9-657712917c2a":  
{ "id": "aaa2ef0d-fae0-48a4-b4d9-657712917c2a", "message": { "id": "aaa2ef0d-fae0-48a4-  
b4d9-657712917c2a", "author": { "role": "user", "name": null, "metadata": {} },  
"create_time": 1714879683.559642, "update_time": null, "content": { "content_type":  
"text", "parts": ["Part 1: In a video or written response, introduce yourself and  
share who you are, what drew you to this program and what you hope to learn or gain  
as a skill set in this course. Why is sustainable resource management important to you?  
Is there a specific issue or sectoral focus that you would like to apply this  
learning to? What are the underlying values and perspectives on resource use  
community vs. individualism that undergird the theories of Hardin's  
tragedy of the commons vs. Ostrom's community  
governance? What assumptions did Hardin make and explain why you agree or  
disagree? What are the different systems controls (i.e.,  
regulation, policy, community engagement) used in each of these types of  
ideology? Hello everyone! It's nice to see some new faces in this course and  
hello to those of you whom I've had the pleasure of meeting in past courses. My  
name is Priscilla. I am a small business owner in California, and it is my hope to  
become a future sustainability leader for my community through the CLU program. As  
someone who is eager to improve our world for future generations, it is my goal to  
take the knowledge gained and apply it to my future endeavors. I feel it is important  
for businesses in both the public and private sectors to utilize renewable energy when  
possible. Although the ability to store renewable energy is not where it needs to be,  
it is my hope to help influence others on how to utilize energy responsibly and to  
reduce dependency on fossil fuel energy. Additionally, I aim to help others  
understand the need to utilize common resources responsibly so everyone in the  
community has equal opportunity. If resources are not utilized responsibly, access  
becomes limited and eventually depleted so setting guidelines is necessary to  
guarantee access for all. As we saw during the quarantine of 2020, some groups  
exploited resources out of fear of not having enough for themselves. Optimizing for  
the self isn't optimal for anyone in the long term. This meant some were not  
allowed the same resources due to resource depletion. Ostrom's community  
governance outlines how proper resource usage is possible through a set of  
guidelines. Clearly defined boundaries, proportional equivalence, participation,  
monitoring, graduated sanctions, conflict resolution, recognition of rights, and  
nested enterprises are the basic principles set by Ostrom in order to bring stability  
and protect the environment (Bisht, V., 2021). In the case of Hardin's  
tragedy of the commons, the human population utilizes social contracts, we  
make communal agreements, we elect governments, and pass laws (Amendolare, N., 2018).  
We do this as a way to protect us from our collective selves and what is good for all  
of us is also good for each of us. Hardin explains how guidelines need to be set up  
as a means to keep resources readily available for all because if left to our own  
devices, it is evident that resources will run out. Unfortunately, I do agree with him  
because we have seen this happen multiple times throughout history. Many animal  
species have gone extinct due to the exploitation of human expansion. One animal from  
our past is the Woolly mammoth. Some scientists attribute their extinction to  
overhunting and climate change which is something many animal species are currently
```


experiencing. A modern example of this are the lemurs of Madagascar. The political crisis of the island country has created a wave of violent unrest and environmental crime. Poaching lemurs serves as a food source for the impoverished population and as a means to financial gains (Breyer, M., 2022). This is why we need to be mindful of our actions and interactions with the natural world. It is a give and take dynamic and the human species has been known to do own fair share of taking. When comparing the theories of Hardin and Ostrom, I see similarities, but they are best applied in different situations. Ostrom's controls seem best suited for smaller settings like local governments or villages. Whereas Hardin's controls seem best suited in larger settings like national and global settings.

Part 2: Choose a real-world example in industry, manufacturing, or in a specific sector (i.e., agricultural company producing palm oil or foreign labor conditions for a U.S. brand of clothing) and research their sustainability measures, transparency, and supply chain management. Do they have a sustainability or ethical production rating? Where could they improve their production or manufacturing?

Make an argument for or against implementing additional sustainability measures. Would the benefits to the environment or to people outweigh the burden of implementing these measures? How would they be enforced? Describe briefly, the complexity or cost that may be involved in the systems change necessary to bring the company or sector into sustainability.

EVs are only as green as the power grid they draw from.

The Guardian (2022)

It is predicted by the year 2030, there will be roughly 145 million electric vehicles on the road. With zero carbon emissions, it is easy to see why they are a better choice over their fossil fuel counterparts. However, there are other aspects to EVs that are unknown to many. There are humanitarian and environmental impacts that must be considered during the manufacturing process. During this process, 60% more carbon is emitted than that of traditional fossil fuel vehicles. This is due to the mining process for the materials needed for batteries of EVs and the transport of these materials. Child labor is also an issue in some areas where cobalt is mined which has been addressed by some EV manufactures. On a sustainability level, EVs are a wonderful option but the power grid they draw power from also needs to be powered by near zero emissions sources like hydroelectric sources in order for them to be truly net zero emitters. Some countries utilize coal-fired power stations and EVs that are charged from these sources contribute nearly the same amount of carbon emissions as regular fossil fuel vehicles. Instead of enforcing the usage of EVs, we should focus on creating a more environmentally friendly public transportation options and reducing our dependency on personal transportation. While this is more doable in densely compacted settings like New York City, spread out suburban settings would be more difficult when cityscapes are much more spread out making public transportation less convenient for some. There are options for electric buses which shows it is possible, but it is at the will of the local governments to implement this option for transportation. For now, there are sustainable options we can utilize like walking or cycling when possible or sharing rides with others when traveling to the same destination (The Guardian, 2022). Not only is this healthier for the environment, this also can create a healthier lifestyle for some willing to try this option which is an added bonus.

Can you write me a 1-2 paragraph response to this discussion post that discusses the true eco-footprint of EV's considering that most electricity is produced using no renewable energy sources? Please end with a question for the author"]], "status": "finished_successfully", "end_turn": null, "weight": 1.0, "metadata": {"request_id": "87eda3649ca80e45-MXP", "timestamp_": "absolute", "message_type": null}, "recipient":

```
"all", "channel": null}, "parent": "f9b26b9f-f87a-41be-aafb-5f9bc2823929", "children":
["a27542d8-c64c-48fb-bb00-dd2ba00b0ded"]}, "a27542d8-c64c-48fb-bb00-dd2ba00b0ded":
{"id": "a27542d8-c64c-48fb-bb00-dd2ba00b0ded", "message": {"id": "a27542d8-c64c-48fb-
bb00-dd2ba00b0ded", "author": {"role": "assistant", "name": null, "metadata": {}},
"create_time": 1714879704.247715, "update_time": null, "content": {"content_type":
"text", "parts": ["Priscilla raises a crucial point regarding the eco-footprint of
electric vehicles (EVs), which is often overshadowed by the clean image projected by
zero tailpipe emissions. The true environmental impact of EVs extends beyond their
operation and into their production and the sources of their electricity. As noted,
the manufacturing process of EVs, particularly the batteries, requires significant
amounts of energy and resources, often leading to higher initial carbon emissions
compared to traditional vehicles. This issue is compounded by the fact that much of
the world's electricity is still generated from non-renewable sources such as
coal and natural gas. \n\nAdditionally, the extraction of materials like lithium,
cobalt, and rare earth elements necessary for EV batteries often involves
environmentally damaging practices and raises ethical concerns, including labor
violations. While EVs present a promising shift towards reducing vehicular emissions,
their overall sustainability is tightly linked to the decarbonization of the
electrical grid and improvements in battery technology and recycling practices. For
EVs to be a truly green option, the energy they consume needs to come from renewable
sources, which is currently not the case in many regions.\n\nPriscilla, considering
these factors, how do you see the role of policy and innovation in aligning the
production and use of EVs with broader environmental goals? What steps should
stakeholders take to ensure that the growth in EV adoption doesn't inadvertently
perpetuate reliance on fossil fuels and exploitation in material sourcing?"]},
"status": "finished_successfully", "end_turn": true
, "weight": 1.0, "metadata": {"finish_details": {"type": "stop", "stop_tokens":
[100260]}, "citations": [], "gizmo_id": null, "is_complete": true, "message_type":
null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "pad":
"AAAAAAAAAAAAAAAAAAAA", "parent_id": "aaa2ef0d-fae0-48a4-b4d9-657712917c2a",
"request_id": "87eda3649ca80e45-MXP", "timestamp_": "absolute"}, "recipient": "all",
"channel": null}, "parent": "aaa2ef0d-fae0-48a4-b4d9-657712917c2a", "children":
["aaa228e2-89af-41ed-9ff0-8f4373e18501"]}, "aaa228e2-89af-41ed-9ff0-8f4373e18501":
{"id": "aaa228e2-89af-41ed-9ff0-8f4373e18501", "message": {"id": "aaa228e2-89af-41ed-
9ff0-8f4373e18501", "author": {"role": "user", "name": null, "metadata": {}},
"create_time": 1714879958.651377, "update_time": null, "content": {"content_type":
"text", "parts": ["Can you make the question tie back to themes and topics disussed in
Tragedy of the Commons and Elinor Ostroms ideas? "]}}, "status":
"finished_successfully", "end_turn": null, "weight": 1.0, "metadata": {"attachments":
[{"id": "file-9kqClbqb0EgXu0SwBScJtUfc", "size": 3050319, "name": "Week 1_A behavioral
approach to the rational choice theory of collective action.pdf", "mime_type":
"application/pdf"}, {"id": "file-BPBvlpnBOVanW3v3Y7AUQ6gF", "size": 140384, "name":
"Week 1_Beyond the Tragedy of the Commons.pdf", "mime_type": "application/pdf"}, {"id":
"file-cxHRA5rBLE0kfr8V3b2mSXzv", "size": 645483, "name": "Week 1_Two Enduring Lessons
from Elinor Ostrom.pdf", "mime_type": "application/pdf"}]}, "request_id":
"87edaalc0eb34bdc-MXP", "timestamp_": "absolute", "message_type": null}, "recipient":
"all", "channel": null}, "parent": "a27542d8-c64c-48fb-bb00-dd2ba00b0ded", "children":
["8e5e7d0a-383a-4526-8cec-19aac4e4cb9c"]}, "8e5e7d0a-383a-4526-8cec-19aac4e4cb9c":
{"id": "8e5e7d0a-383a-4526-8cec-19aac4e4cb9c", "message": {"id": "8e5e7d0a-383a-4526-
```

8cec-19aac4e4cb9c", "author": {"role": "system", "name": null, "metadata": {}}, "create_time": 1714879983.517658, "update_time": null, "content": {"content_type": "text", "parts": [""], "status": "finished_successfully", "end_turn": true, "weight": 0.0, "metadata": {"rebase_system_message": true, "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "parent_id": "aaa228e2-89af-41ed-9ff0-8f4373e18501", "request_id": "87edaalc0eb34bdc-MXP", "timestamp": "absolute", "is_visually_hidden_from_conversation": true}, "recipient": "all", "channel": null}, "parent": "aaa228e2-89af-41ed-9ff0-8f4373e18501", "children": ["9e773799-44c5-4f16-aa68-8f10860e7091"]}, {"id": "9e773799-44c5-4f16-aa68-8f10860e7091", "message": {"id": "9e773799-44c5-4f16-aa68-8f10860e7091", "author": {"role": "tool", "name": "myfiles_browser", "metadata": {}}, "create_time": 1714879983.518481, "update_time": null, "content": {"content_type": "tether_quote", "url": "file-9kqClbqbOEgXu0SwBScJtUfc", "domain": "Week 1_A behavioral approach to the rational choice theory of collective action.pdf", "text": "\nAmerican Political Science Review Vol. 92, No.1 March 1998\n\nA Behavioral Approach to the Rational Choice Theory of Collective Action\n\nPresidential Address, American Political Science Association, 1997\n\nELINOR OSTROM Indiana University\n\nText\n\nExtensive empirical evidence and theoretical developments in multiple disciplines stimulate a need to expand the range of rational choice models to be used as a foundation for the study of social dilemmas and collective action. After an introduction to the problem of overcoming social dilemmas\n\nthrough collective action, the remainder of this article is divided into six sections. The first briefly reviews the theoretical predictions of currently accepted rational choice theory related to social dilemmas. The second section summarizes the challenges to the sole reliance on a complete model of rationality presented by\n\nextensive experimental research. In the third section, I discuss two major empirical findings that begin to\n\nshow how individuals achieve results that are 'better than rational' by building conditions where reciprocity, reputation and trust can help to overcome the strong temptations of short-run self-interest. The fourth section raises the possibility of developing second-generation models of rationality, the fifth section develops\n\nan initial theoretical scenario, and the final section concludes by examining the implications of placing\n\nreciprocity reputation and trust at the core of an empirically tested, behavioral theory of collective action.\n\nWe are hand-waving at our central questions. I am\n\nafraid that we do a lot of hand-waving.\n\nLet me start with a provocative statement. You\n\nwould not be reading this article if it were not for\n\nsome of our ancestors learning how to undertake\n\ncollective action to solve social dilemmas. Successive\n\ngenerations have added to the stock of everyday knowledge about how to instill productive norms of behavior\n\nin their children and to craft rules to support collective\n\naction that produces public goods and avoids 'tragedies of the commons.'\n\nWhat our ancestors and contemporaries have learned about engaging in collective\n\naction for mutual defense, child rearing, and survival is\n\nnot, however, understood or explained by the extant\n\ntheory of collective action.\n\nThe lessons of effective collective action are not\n\nsimple\n\nas is obvious from human history and the\n\nimmense tragedies that humans have endured, as well\n\nas the successes we have realized. As global relationships become even more intricately intertwined and\n\ncomplex, however, our survival becomes more dependent on empirically grounded scientific understanding.\n\nWe have not yet developed a behavioral theory of\n\ncollective action based on models of the individual\n\nconsistent with empirical evidence about how individuals make decisions in social-dilemma

situations. A behavioral commitment to theory grounded in empirical inquiry is essential if we are to understand such basic questions as why face-to-face communication so consistently enhances cooperation in social dilemmas nor how structural variables facilitate or impede effective collective action.

Social dilemmas occur whenever individuals in interdependent situations face choices in which the maximization of short-term self-interest yields outcomes leaving all participants worse off than feasible alternatives. In a public-good dilemma, for example, all those who would benefit from the provision of a public good such as pollution control, radio broadcasts or weather forecasting find it costly to contribute and would prefer others to pay for the good instead. If everyone follows the equilibrium strategy, then the good is not provided or is underprovided. Yet, everyone would be better off if everyone were to contribute.

Social dilemmas are found in all aspects of life, leading to momentous decisions affecting war and peace as well as the mundane relationships of keeping promises in everyday life. Social dilemmas are called by many names, including the public-good or collective-good problem (Olson 1965, P. Samuelson 1954), shirking (Alchian and Demsetz 1972), the free-rider problem (Edney 1979, Grossman and Hart 1980), moral hazard (Holmstrom 1982), the credible commitment dilemma (Williams, Collins, and Lichbach 1997), generalized social exchange (Eckel 1974; Emerson 1972a).

Yet, the theory of collective action is the central subject of political science. It is the core of the justification for the state. Collective-action problems pervade international relations, face legislators when devising public budgets, permeate public bureaucracies, and are at the core of explanations of voting, interest group formation, and citizen control of governments in a democracy. If political scientists do not have an empirically grounded theory of collective action, then

Elinor Ostrom is Arthur F. Bentley Professor of Political Science; Co-Director, Workshop in Political Theory and Policy Analysis; and Co-Director, Center for the Study of Institutions, Population, and Environmental Change; Indiana University, Bloomington, IN 47408-3895.

The author gratefully acknowledges the support of the National Science Foundation (Grant #SBR-9319835 and SBR-9521918), the Ford Foundation, the Bradley Foundation, and the MacArthur Foundation. My heartfelt thanks go to James Alt Jose Apesteguia, Patrick Brandt, Kathryn Firmin-Sellers, Roy Gardner, Derek Kau-Neckis, Fabrice Lehoucq, Margaret Levi, Thomas Lyon, Tony Matesz, Mike McGinnis, Trudi Miller, John Orbell, Vincent Ostrom, Eric Rasmusen, David Schmidt, Sujai Shivakumar, Vernon Smith, Catherine Tucker, George Varughese, Jimmy Walker, John Williams, Rick Wilson, Toshio Yamagishi, and Xin Zhang for their comments on earlier drafts and to Patty Dalecki for all her excellent editorial and moral support.

The term "tragedy of the commons" refers to the problem that common-pool resources, such as oceans, lakes, forests, irrigation systems, and grazing lands can easily be overused or destroyed if property rights to these resources are not well defined (see Hardin 1968).

A Behavioral Approach to the Rational Choice Theory of Collective Action_ Presidential Address, American Political Science Association, 1997 on JSTOR __ Reader View

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

"title": "Week 1_A behavioral approach to the rational choice theory of collective action.pdf", "tether_id": null, "status": "finished_successfully", "end_turn": null, "weight": 1.0, "metadata": {"command": "context_stuff",

"is_visually_hidden_from_conversation": true, "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "parent_id": "8e5e7d0a-383a-4526-8cec-19aac4e4cb9c", "request_id": "87edaalc0eb34bdc-MXP", "timestamp": "absolute", "recipient": "all", "channel": null, "parent": "8e5e7d0a-383a-4526-8cec-19aac4e4cb9c", "children": [{"id": "abecb08b-5001-46ea-8e6e-772018a9bea6"}], "abecb08b-5001-46ea-8e6e-772018a9bea6": {"id": "abecb08b-5001-46ea-8e6e-772018a9bea6", "message": {"id": "abecb08b-5001-46ea-8e6e-772018a9bea6", "author": {"role": "tool", "name": "myfiles_browser", "metadata": {}}, "create_time": 1714879983.518714, "update_time": null, "content": {"content_type": "tether_quote", "url": "file-BPBvlpnBOVanW3v3Y7AUQ6gF", "domain": "Week 1_Beyond the Tragedy of the Commons.pdf", "text": "\nContents lists available at ScienceDirect\n\nEnergy Research & Social Science\n\njournal homepage: www.elsevier.com/locate/erss\n\nPerspectives\n\nBeyond the tragedy of the commons: Reframing effective climate change\ngovernance\n\nAnthony Patt\nETH Z\u00fcrich, Switzerland\n\nA R T I C L E I N F O\n\nKeywords:\nClimate policy\nTragedy of the commons\nGlobal commons problem\nTechnological transitions\n\nA B S T R A C T\n\nThe tragedy of the commons provides a powerful narrative for a class of environmental problems, and serves to\nframe them in a way that allows people to identify effective solution strategies. But the problem frame also rests\non a set of factual and value-based assumptions, and is inappropriate to guide decision-making when these\nassumptions are violated. The climate change mitigation challenge \u2013 reducing greenhouse gas emissions, mainly\nfrom the energy sector, to limit global warming to less than 1.5 or 2 \u00b0C \u2013 violates these assumptions. Climate\nchange requires us not to reduce, but to completely prohibit greenhouse gas emissions. Before any such\nprohibition is feasible, it is first essential to develop a clean energy system that can meet our basic needs. The\nmain barriers to this are not economic, but rather are associated with evolving knowledge, networks, and\ninstitutions. Framing climate change in evolutionary terms can help us to appraise policy options more\neffectively, and ultimately identify those that get us where we need to go.\n\n1. The tragedy of the commons\n\nThe biologist and ethnic nationalist Garrett Hardin wanted society\nto restrict people\u2019s reproductive freedom, and believed that only those\nparents who would raise their children the right way should be entitled\nto have babies [1,2]. To support this politically charged belief, Hardin\ndeveloped an argument based on the idea of the tragedy of the commons,\na game theoretic model involving farmers\u2019 letting their cows graze on\nthe communally owned village green [3]. Every farmer obtains the full\nbenefit of placing an extra cow on the commons to graze, while\nsuffering only a small share of the cost to the community as a whole,\nin terms of less grass being available to the other cows. Overgrazing is\nthe inevitable equilibrium, unless the community as a whole steps in.\n\nLimiting the number of cows, and ideally allocating them to those\nfarmers who can manage them most profitably, is the obvious solution.\n\nThe lesson transferred well to the point Hardin was trying to make\nabout people in his now famous article.\n\nToday, few would use a tragedy of the commons framing, or related\nterms such as commons problem, common pool resource problem, or\nexternalities problem, to describe the issue of human population growth.\n\nThis is largely because the world has witnessed birthrates falling\nglobally, on most continents to below replacement levels, as a result\nof factors Hardin didn\u2019t consider: the education of women, reductions in\ninfant mortality, and urbanization [4,5]. But most analysts do use\nHardin\u2019s idea to describe other environmental problems, most notably\nclimate change, and based on this framing suggest a strategy

similar to what Hardin advocated [6]. The framing may be appropriate for some of these problems, fisheries management being an example that comes to mind. But it is not appropriate for climate change, and the sooner we stop framing climate change in this way, the better. As a starting point, it is worth considering what the key aspects of a commons problem actually are. Hardin himself described four, and these are as valid today as they were then. First, of course, there needs to be a common pool resource, such as the grass on a village green, or the global carrying capacity for people. Second, there needs to be a use of that resource, or an activity that depletes it, that is legitimate and valuable, accepted by society at large. In Hardin's model, we do want cows to graze on the village green, as long as they do so productively, just as we do want a planet that is home to people. In fact, because the use is so valuable, we want to ensure that it takes place in a manner that is both optimal and sustainable. Third, the common-pool nature of the resource has to be the thing that leads people to overuse or over-deplete the resource, to the point that is clearly suboptimal, perhaps even exceeding its sustainable limits. Fourth, there cannot be a technical solution. By this, Hardin meant that it is not possible to use technology to expand the resource in order to continually accommodate the growing use. The tragedy of the commons acts a problem frame. The effect of a problem frame is to take a complex issue which affects multiple values and can be considered from a variety of perspectives and to simplify it around one particular conceptualization, leading to one particular solution strategy [7]. In the case of this framing, it is the third

aspect
<http://dx.doi.org/10.1016/j.erss.2017.05.023> Received 16 May 2017; Accepted 18 May 2017
E-mail address: anthony.patt@usys.ethz.ch.
Energy Research & Social Science 34 (2017) 1–13
Available online 27 May 2017
2214–6296/ © 2017 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY license

(<http://creativecommons.org/licenses/by/4.0/>).
T
<http://www.sciencedirect.com/science/journal/22146296>
<http://www.elsevier.com/locate/erss>
<http://dx.doi.org/10.1016/j.erss.2017.05.023>
<mailto:anthony.patt@usys.ethz.ch>
<https://doi.org/10.1016/j.erss.2017.05.023>
<http://crossmark.crossref.org/dialog/?doi=10.1016/j.erss.2017.05.023&domain=pdf>
listed in the paragraph above that is crucial. The common-pool ownership structure, meaning that agents do not pay the full cost of their use, is seen as the driving force behind their overuse. Framing a problem as a tragedy of the commons automatically implies that if one could privatize the ownership structure, or make the agents pay the full costs to society of their use of the resource, then an optimal outcome would be achieved. In the case of a village green, the easy solution is to divide it up with fences, and have each subdivided plot belong to a single farmer. In the case of a resource that cannot be subdivided so easily, like the global carrying capacity for humans, then the solution is only slightly more complicated. Either one has to establish a limited number of rights to use the resource, and allocate these to people in advance, or one has to charge people ex post for their use of the resource. An important feature of the model is that the solution increases the resource's overall productivity. And that means that as long as the allocation mechanism or tax is fair, then reaching an agreement to privatize the use rights or internalize their costs should be politically feasible. But the usefulness of such policy guidance depends on the underlying applicability of the problem frame. The presence of a common-pool resource does not guarantee that Hardin's solution strategy is

the best; the problem frame ceases to provide useful guidance if any of the other three criteria are violated. A case that illustrates failure on the second of the four criteria is the act of murdering one's neighbor. This depletes the common pool resource of public safety, but murder is not an activity that we want, so we don't solve it by imposing a tax or allocating a limited number of permits. We prohibit it. To illustrate failure on the third criterion, drinking alcohol is a behavior that we tolerate in moderation, and even encourage in some situations, but when people get drunk and start breaking things, they become a public nuisance. Yet we don't believe that internalizing the cost of drunken behavior will get the person on the verge of intoxication to say no to another drink. So we address it by other means, including charging bartenders with cutting people off, and providing treatment programs for alcoholism. To illustrate failure on the fourth criterion, the local public school may be overcrowded, but we can solve this by enlarging the building and hiring more teachers. So we do that, rather than limiting the number of places available or imposing high school fees. Failure on any of these criteria matters. Climate change fails on all three.

2. Why climate change fails the tragedy of the commons criteria

Many people see the 2015 Paris Agreement as representing a turning point in climate governance, but in fact the events that foreshadowed Paris occurred a decade prior to then, culminating in 2007. It was then that the idea of the 2 °C target gained popularity, based on risk management arguments, and was incorporated into a global action plan agreed to in Bali, Indonesia, at the closing of a failed set of negotiations to extend or replace the Kyoto Protocol [8]. Paris built on this decision, and added an additional level of ambition by suggesting the desirability of limiting climate change to 1.5 °C. More importantly, Paris set up a process that could help countries to take the steps to achieve one or the other, in terms of a regular global stocktake, as well as a set of mechanisms to provide financial and capacity-building support to developing countries.

The one thing that the Paris Agreement does not include is a set of negotiated binding national targets, of the kind that are the heart of the Kyoto Protocol. In fact, the failed desire to include such binding targets is what led to the eight-year delay, starting in Bali. And yet this failure should not surprise us, for a simple reason. The tragedy of the commons framing suggests that negotiating binding targets should be politically infeasible, with the main hurdle being the identification of a mutually acceptable allocation rule for the net benefits. But this presupposes that the global target is one that will maximize the value to society of whatever activity it is that degrades the common pool resource. Partial decarbonization as per Kyoto could take place by eliminating inefficiencies in the energy system, and arguably could deliver immediate net economic benefits; negotiating the allocation rule took less than two years. Achieving the Paris targets of 2 °C or 1.5 °C, however, requires that net anthropogenic emissions of greenhouse gases into the atmosphere cease entirely in the second half of this century [11]. Finding immediate net benefits to allocate that are associated with a complete halting of emissions is more or less impossible, and so negotiating such an agreement required convincing people to pay attention to large benefits anticipated in the future, in some cases centuries hence [12, 8]. So the temperature target qualitatively changed the character of negotiations, making them far more difficult, arguably impossible. More fundamentally, the need to eliminate emissions entirely, essentially as soon as possible, makes those emissions something that society will

no longer tolerate. So climate change fails the second of the four criteria Hardin identified, just like murder.

There has been another major change since about 2007, and that is the recognition that the medium-term costs of eliminating greenhouse gas emissions are likely to be trivial, and may in fact be negative, even before considering the long-term benefits from avoided climate impacts [13,14]. What drove this recognition was the realization from the field of evolutionary economics that policies to expand renewable energy also make them cheaper [15,16]. This fact has become especially salient lately, as the costs of supplying energy from some renewable resources have fallen to below those of fossil fuels [17], especially if one takes into account local environmental effects such as air pollution or water demand [18]. A study in the United States, for example, examined the avoided local and regional environmental impacts associated with installing wind and solar power instead of new coal capacity, and found the value of those impacts to be far larger than the difference in cost between the two technologies [19]. As another example, the costs to own and drive an electric car charged by wind or solar power are approaching parity with those of a conventional gasoline model, at least under some conditions [20].

These trends suggest two additional ways in which the tragedy of the commons framing fails for climate change. First, there is no longer a necessary misalignment of incentives between the emitters of greenhouse gases and society at large. Every country, with the possible exception of major oil and gas exporters, has reason to mitigate climate change and transform its national energy sector away from fossil fuels, regardless of what other countries may do. Every household will soon have a financial incentive to stop burning oil and gas, regardless of what their neighbors do. So if fossil fuels are still in business, it will not be because of an unjust cost advantage, born from the existence of an externality. Climate change is like the example of public drunkenness: internalizing the cost will not change anything qualitatively. Second, it now appears that a technical solution does exist for climate change. Integrated assessment models suggest that by switching to non-fossil energy sources, we can continue to see global economic activity grow, at roughly the same pace, even as greenhouse gas emissions come to a halt [21]. Climate change is like enlarging the public school.

3. Framing today's challenge in evolutionary terms

But we still have a problem needing to be solved. Using electric cars as an example, a household may soon have a financial incentive to switch over from their gasoline model, but it will not do so unless there is a dense network of charging stations where they want to take long trips. At the same time, there is no business case to install such a network as long as the number of electric cars on the road remains low. This is a chicken and egg problem: you need a chicken to get an egg, but an egg to get a chicken. Similar problems exist across the energy sector.

At the most general level, we need to prohibit greenhouse gas emissions, which almost certainly means prohibiting fossil fuels. But which comes first: prohibition, or clean energy? Before prohibition can be politically and socially feasible, we need a clean energy system that

A. Patt Energy Research & Social Science 34 (2017)

1

2013

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

39

40

41

42

43

44

45

46

47

48

49

50

51

52

53

54

55

56

57

58

59

60

61

62

63

64

65

66

67

68

69

70

71

72

73

74

75

76

77

78

79

80

81

82

83

84

85

86

87

88

89

90

91

92

93

94

95

96

97

98

99

100

101

102

103

104

105

106

107

108

109

110

111

112

113

114

115

116

117

118

119

120

121

122

123

124

125

126

127

128

129

130

131

132

133

134

135

136

137

138

139

140

141

142

143

144

145

146

147

148

149

150

151

152

153

154

155

156

157

158

159

160

161

162

163

164

165

166

167

168

169

170

171

172

173

174

175

176

177

178

179

180

181

182

183

184

185

186

187

188

189

190

191

192

193

194

195

196

197

198

199

200

201

202

203

204

205

206

207

208

209

210

211

212

213

214

215

216

217

218

219

220

221

222

223

224

225

226

227

228

229

230

231

232

233

234

235

236

237

238

239

240

241

242

243

244

245

246

247

248

249

250

251

252

253

254

255

256

257

258

259

260

261

262

263

264

265

266

267

268

269

270

271

272

273

274

275

276

277

278

279

280

281

282

283

284

285

286

287

288

289

290

291

292

293

294

295

296

297

298

299

300

301

302

303

304

305

306

307

308

309

310

311

312

313

314

315

316

317

318

319

320

321

322

323

324

325

326

327

328

329

330

331

332

333

334

335

336

337

338

339

340

341

342

343

344

345

346

347

348

349

350

351

352

353

354

355

356

357

358

359

360

361

362

363

364

365

366

367

368

369

370

371

372

373

374

375

376

377

378

379

380

381

382

383

384

385

386

387

388

389

390

391

392

393

394

395

396

397

398

399

400

401

402

403

404

405

406

407

408

409

410

411

412

413

414

415

416

417

418

419

420

421

422

423

424

425

426

427

428

429

430

431

432

433

434

435

436

437

438

439

440

441

442

443

444

445

446

447

448

449

450

451

452

453

454

455

456

457

458

459

460

461

462

463

464

465

466

467

468

469

470

471

472

473

474

475

476

477

478

479

480

481

482

483

484

485

486

487

488

489

490

491

492

493

494

495

496

497

498

499

500

501

502

503

504

505

506

507

508

509

510

511

512

513

514

515

516

517

518

519

520

521

522

523

524

525

526

527

528

529

530

531

532

533

534

535

536

537

538

539

540

541

542

543

544

545

546

547

548

549

550

551

552

553

554

555

556

557

558

559

560

561

562

563

564

565

566

567

568

569

570

571

572

573

574

575

576

577

578

579

580

581

582

583

584

585

586

587

588

589

590

591

592

593

594

595

596

597

598

599

600

601

602

603

604

605

606

607

608

609

610

611

612

613

614

615

616

617

618

619

620

621

622

623

624

625

626

627

628

629

630

631

632

633

634

635

636

637

638

639

640

641

642

643

644

645

646

647

648

649

650

651

652

653

654

655

656

657

658

659

660

661

662

663

664

665

666

667

668

669

670

671

672

673

674

675

676

677

678

679

680

681

682

683

684

685

686

687

688

689

690

691

692

693

694

695

696

697

698

699

700

701

702

703

704

705

706

707

708

709

710

711

712

713

714

715

716

717

718

719

720

721

722

723

724

725

726

727

728

729

730

731

732

733

734

735

736

737

738

739

740

741

742

743

744

745

746

747

748

749

750

751

752

753

754

755

756

757

758

759

760

761

762

763

764

765

766

767

768

769

770

771

772

773

774

775

776

777

778

779

780

781

782

783

784

785

786

787

788

789

790

791

792

793

794

795

796

797

798

799

800

801

802

803

804

805

806

807

808

809

810

811

812

813

814

815

816

817

818

819

820

821

822

823

824

825

826

827

828

829

830

831

832

833

834

835

836

837

838

839

840

841

842

843

844

845

846

847

848

849

850

851

852

853

854

855

856

857

858

859

860

861

862

863

864

865

866

867

868

869

870

871

872

873

874

875

876

877

878

879

880

881

882

883

884

885

886

887

888

889

890

891

892

893

894

895

896

897

898

899

900

901

902

903

904

905

906

907

908

909

910

911

912

913

914

915

916

917

918

919

920

921

922

923

924

925

926

927

928

929

930

931

932

933

934

935

936

937

938

939

940

941

942

943

944

945

946

947

948

949

950

951

952

953

954

955

956

957

958

959

960

961

962

963

964

965

966

967

968

969

970

971

972

973

974

975

976

977

978

979

980

981

982

983

984

985

986

987

988

989

990

991

992

993

994

995

996

997

998

999

1000

millions of years to get a chicken when the starting point was a dinosaur. Accelerating evolution is the key challenge for climate policy. Just as the tragedy of the commons framing offered clear guidance in terms of the appropriate policy instruments, so too does an evolutionary framing, based on insights from the emerging scientific study of socio-technical transitions [22]. Our policy instruments need to be those that build the new knowledge, networks, and institutions that will enable a clean energy system to function smoothly and affordably, which is a prerequisite to phasing out fossil fuels. When we think about all of the policies that support renewable energy innovation and deployment — state-sponsored R & D, tax credits or feed-in tariffs for project developers, and streamlined permitting processes for green infrastructure — that is exactly what is going on. As they create a new system that is viable, these policies lay the groundwork for a second generation of sectoral regulations, already beginning to appear, which prevent new investment into fossil fuel infrastructure. If you frame climate change as an evolutionary problem, it is this sequence of policy instruments that makes the most sense [23].

The issue of how we frame climate change mitigation is important, precisely because the two framings point us in different directions with respect to policy. When there is a true tragedy of the commons, then neo-classical economics and game theory provide a solid basis to favor market-based instruments, those that allocate limited rights to deplete the resource or internalize the costs of doing so [24]. Confusion can arise, however, because proponents of market-based instruments also suggest that these will provide the needed stimulus for innovation, promoting systemic change [25,26]. But just because these instruments are the best solution to one kind of problem does not mean they are very good or effective with respect to another. In fact, a growing literature shows that they aren't, and that the effective policies to stimulate a transition are those that directly support the development of new knowledge, networks, and institutions, directly addressing the barriers to systemic change [27]. The choice of how we frame climate change dictates the terms by which we evaluate the relative strengths and weaknesses of the different possible solution strategies. Judged by the appropriate criteria, market instruments are generally a poor fit.

The tragedy of the commons framing made sense at a time when we believed that people needed to adjust the energy system at the margins, and believed that the cost of doing so would be high. We no longer believe these things. The atmosphere may be a common pool resource, but using it as a place to put our greenhouse gas emissions is no longer something for which we have any long-term rights to allocate. To prohibit dumping our greenhouse gases there, we first need to accelerate a technological transition towards non-fossil sources of energy, for which the main barriers have to do with knowledge and networks, rather than an inherent difference in cost. Policies providing active and direct governmental support for new technologies and technological systems can change the conditions that hold the new technologies back. In fact they have already done a great deal; they have led to a dramatic decline in the costs of key energy technologies, and contributed to the possibility that global emissions have already peaked. There is still more work to be done, and we can solve climate change if we build on what we have learned. At all costs, we should resist the temptation to reverse course because the policies don't fit one man's convenient story of too many cows on a village green.

Acknowledgment

Funding for the development of the ideas expressed in this article came from European Research Council Starting Grant number

313553. \n\nReferences\n\n[1] G. Hardin, The tragedy of the commons, *Science* 162 (3859) (1968) 1243\u20131248. \n[2] J. Oakes, Garrett Hardin's tragic sense of life, *Sci. Publ. Eye* 40 (4) (2016) 238\u2013247, \nhttp://dx.doi.org/10.1016/j.endeavour.2016.10.007. \n[3] J. Nash, Equilibrium points in N-person games, *Proc. Natl. Acad. Sci. U. S. A.* 36\n\n(1950) 48\u201349. \n[4] United Nations Population Division, *World Population Prospects: The 2006\n\nRevision*, United Nations Department of Economic and Social Affairs, 2007, <http://esa.un.org/unpp>. \n[5] W. Lutz, J. Crespo Cuaresma, W. Sanderson, The demography of educational attainment and economic growth, *Science* 319 (2008) 1047\u20131048. \n[6] R. Stavins, J. Zou, T. Brewer, M. Conte Grand, M. Elzen, M. den Finus, J. Gupta, \nN. H\u00f6hne, M. Lee, A. Michaelowa, M. Patterson, K. Ramakrishna, G. Wen, \nJ. Wiener, H. Winkler, *International cooperation: agreements & instruments*, \nClimate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK and New York, USA, 2014, pp. 1001\u20131082. \n[7] D. Chong, J. Druckman, Framing theory, *Annu. Rev. Polit. Sci.* 10 (2007) 103\u2013126. \n[8] T. Barker, The economics of avoiding dangerous climate change. An editorial essay\n\non The Stern Review, *Clim. Change* 89 (3) (2008) 173. \n[9] K. Hasselmann, T. Barker, The Stern Review and the IPCC fourth assessment report: \nimplications for interactions between policymakers and climate experts. An editorial essay, *Clim. Change* 89 (2008) 219\u2013229. \n[10] S. Randalls, History of the 2 \u00b0C climate target, *Wiley Interdiscip. Rev. Clim. Change* 1 (4) (2010) 598\u2013605, <http://dx.doi.org/10.1002/wcc.62>. \n[11] M. Meinshausen, N. Meinshausen, W. Hare, S.C.B. Raper, K. Frieler, R. Knutti, \nD.J. Frame, M.R. Allen, Greenhouse-gas emission targets for limiting global warming to 2 \u00b0C, *Nature* 458 (7242) (2009) 1158\u20131162, <http://dx.doi.org/10.1038/nature08017>. \n[12] N. Stern, *The Economics of Climate Change*, Cambridge University Press, Cambridge, UK, 2007. \n[13] O. Edenhofer, N. Bauer, E. Kriegler, The impact of technological change on climate protection and welfare: insights from the model MIND, *Ecol. Econ.* 54 (2\u20133) (2005) 277\u2013292. \n[14] IPCC, *Climate Change 2014: Mitigation of Climate Change. Working Group III Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, in: O. Edenhofer, R. Pichs-Madruga, Y. Sokona, E. Farahani, \nS. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, \nJ. Savolainen, S. Schl\u00f6mer, C. von Stechow, T. Zwickel, J. Minx (Eds.), Cambridge University Press, Cambridge, UK and New York, USA, 2014. \n[15] W.B. Arthur, Competing technologies, increasing returns, and lock-in by historical events, *Econ. J.* 99 (1989) 116\u2013131. \n[16] L. Argote, D. Epple, Learning curves in manufacturing, *Science* 247 (4945) (1990) 920\u2013924. \n[17] B. Obama, The irreversible momentum of clean energy, *Science* 355 (2017) 126\u2013129, <http://dx.doi.org/10.1126/science.aam6284>. \n[18] P.G. Bain, T.L. Milfont, Y. Kashima, M. Bilewicz, G. Doron, R.B. Gar\u00f0arsdottir, \nV.V. Gouveia, Y. Guan, L. -O. Johansson, C. Pasquali, V. Corral-Verdugo, \nJ.I. Aragones, A. Utsugi, C. Demarque, S. Otto, J. Park, M. Soland, L. Steg, \nR. Gonzalez, N. Lebedeva, O.J. Madsen, C. Wagner, C.S. Akotia, T. Kurz, J.L. Saiz, \nP.W. Schultz, G. Einarsdottir, N.M. Saviolidis, Co-benefits of addressing climate change can motivate action around the world, *Nat. Clim. Change* 6 (2) (2016) 154\u2013157. \n[19] K. Siler-Evans, I.L. Azevedo, M.G. Morgan, J. Apt, Regional variations in the health, \nenvironmental, and climate benefits of wind and solar generation, *Proc. Natl. Acad. Sci.* 110 (29) (2013) 11768\u201311773, <http://dx.doi.org/10.1073/pnas.1221978110>. \n[20] J. Riesz, C. Sotiriadis, D. Ambach,

S. Donovan, Quantifying the costs of a rapid transition to electric vehicles, *Appl. Energy* 180 (2016) 287–300, <http://dx.doi.org/10.1016/j.apenergy.2016.07.131>.

[21] L. Clark, K. Jiang, K. Akimoto, M. Babiker, G. Blanford, K. Fischer-Vanden, J.-C. Hourcade, V. Krey, E. Kriegler, A. Löffel, D. McCollum, S. Paltsev, S. Rose, P.R. Shukla, M. Tavoni, B.C.C. van der Zwaan, D.P. van Vuuren, Assessing transformation pathways, *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, UK and New York, USA, 2014, pp. 413–510.

[22] F. Geels, Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study, *Res. Policy* 31 (2002) 1257–1274.

[23] A. Patt, *Transforming Energy: Solving Climate Change with Technology Policy*, Cambridge University Press, New York, 2015.

[24] P. Portney, R. Stavins, *Public Policies for Environmental Protection, Resources for the Future*, Washington, 2000.

[25] R. Naam, *The Infinite Resource: The Power of Ideas on a Finite Planet*, University Press of New England, Lebanon, NH, 2013.

[26] E. Somanathan, T. Sterner, T. Sugiyama, D. Chimanikire, N.K. Dubash, J. Essandoh-Yeddu, S. Fifita, L. Goulder, A. Jaffe, X. Labandeira, S. Managi, C. Mitchell, J.P. Montero, F. Teng, T. Zylicz, National and sub-national policies and institutions, *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, UK and New York, USA, 2014, pp. 1141–1205.

[27] M. Grubb, *Planetary Economics: Energy, Climate Change and the Three Domains of Sustainable Development*, Earthscan, London, 2014.

A. Patt *Energy Research & Social Science* 34 (2017) 1–3, [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0005](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0005) <http://dx.doi.org/10.1016/j.endeavour.2016.10.007> [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0015](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0015) <http://esa.un.org/unpp> <http://esa.un.org/unpp> [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0025](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0025) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0035](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0035) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0040](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0040) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0040](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0040) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0045](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0045) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0045](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0045) <http://dx.doi.org/10.1002/wcc.62> <http://dx.doi.org/10.1038/nature08017> [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0060](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0060) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0060](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0060) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0065](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0065) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0065](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0065) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0065](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0065)

3/sbref0070\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0075\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0075\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0080\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0080\nhttp://dx.doi.org/10.1126/science.aam6284\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090\nhttp://dx.doi.org/10.1073/pnas.1221978110\nhttp://dx.doi.org/10.1016/j.apenergy.2016.07.131\nhttp://dx.doi.org/10.1016/j.apenergy.2016.07.131\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0110\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0110\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0115\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0120\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0120\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0125\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0125\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0135\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0135\n\nBeyond the tragedy of the commons: Reframing effective climate change governance\n\nThe tragedy of the commons\n\nWhy climate change fails the tragedy of the commons criteria\n\nFraming challenge in evolutionary terms\n\nAcknowledgment\n\nReferences\n\n\n\n\n", "title": "Week 1_Beyond the Tragedy of the Commons.pdf", "tether_id": null, "status": "finished_successfully", "end_turn": null, "weight": 1.0, "metadata": {"command": "context_stuff", "is_visually_hidden_from_conversation": true, "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "parent_id": "9e773799-44c5-4f16-aa68-

"request_id": "87edaa1c0eb34bdc-MXP", "timestamp_": "absolute"},
"recipient": "all", "channel": null}, "parent": "9e773799-44c5-4f16-aa68-8f10860e7091",
"children": [{"id": "9624b7b7-0916-4ba7-89ee-9cee21fd269b"}], "9624b7b7-0916-4ba7-89ee-9cee21fd269b": {"id": "9624b7b7-0916-4ba7-89ee-9cee21fd269b", "message": {"id": "9624b7b7-0916-4ba7-89ee-9cee21fd269b", "author": {"role": "tool", "name": "myfiles_browser", "metadata": {}}, "create_time": 1714879983.518881, "update_time": null, "content": {"content_type": "tether_quote", "url": "file-cxHRA5rBLE0kfR8V3b2mSXzv", "domain": "Week 1_Two Enduring Lessons from Elinor Ostrom.pdf", "text": "\nElectronic copy available at:
<http://ssrn.com/abstract=2252133>Electronic copy available at:
<http://ssrn.com/abstract=2252133>Electronic copy available at:

The author wishes to thank the editor-in-chief, two anonymous referees, Michael Burstein, Daniel Cole, Michael Madison, Al Roundtree, Charles Schweik, Alex Stein, and Katherine Strandburg for their constructive comments and suggestions. The usual disclaimer applies. Throughout this article, I refer to contributions made by Ostrom and do not list all of her many collaborators nor people who also made related contributions. But I want to be clear that she collaborated with many others and she readily acknowledged the independent contributions of many others working on similar issues. Electronic copy available at:

<https://ssrn.com/abstract=2252133> Journal of Institutional Economics

(forthcoming 2013) Substantive Lesson: Embrace complexity and context or simply, reality; avoid distorting reductionism and overstated gains from simple models. Methodological Lesson: Embrace systematic, evolutionary learning through various interdisciplinary methodologies, theories, and empirical approaches, including case studies; be aware of, and try to avoid, path dependencies from disciplinary or methodological blinders. The first lesson leads to the second. Anyone can say that one should embrace complexity and study reality, and many people do. What makes Elinor Ostrom incredibly special is that she worked tirelessly to develop a robust framework for doing it, and she did it, time and again, and in a collaborative way that built an international interdisciplinary community. In Part I, I discuss Ostrom's work on environmental commons. I illustrate the two lessons in the environmental context with a discussion of the tragedy of the commons. Ostrom's theoretical and empirical contributions probably are best recognized in the environmental context. Her contributions extend much further, as the Nobel Prize Committee recognized when it awarded her the 2009 prize along with Oliver Williamson. Still, there is plenty of work to be done in exploring and extending her contributions in other contexts. In Part II, I focus on that exploration and explain how the two lessons play a significant role in recent efforts to extend Ostrom's work on environmental commons to knowledge/cultural commons. I draw a parallel between the tragedy of the commons allegory and the free rider allegory, and then show how many of the problems Ostrom identified and explored in the environmental context are manifest in the cultural environmental context. I briefly discuss an ongoing research project that aims to follow the path that Ostrom blazed and systematically study commons in the cultural environment. I. Two Lessons from Ostrom's Work on Environmental Commons Elinor Ostrom's pioneering work challenged the notion that rational human beings would be helplessly trapped in social dilemmas. Much of her work focused on environmental commons and confronted the then-dominant and still powerful concept of the tragedy of the commons. The term commons would generally conjures up the notion of a shared community resource, such as a public park or a common pasture. The term gained considerable notoriety among economists, political scientists, and other social scientists after the publication of Garrett Hardin's essay The Tragedy of the Commons in Science (1968). Hardin (1968: 1244) described the tragedy of the commons as follows: Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he Electronic copy available at:

<https://ssrn.com/abstract=2252133> Journal of Institutional Economics

(forthcoming 2013) What is the utility to me of adding

one more animal to my herd?" This utility has one negative and one positive component. (1) The positive component is a function of the increment of one animal. Since the herdsman receives all the proceeds from the sale of the additional animal, the positive utility is nearly +1. (2) The negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all the herdsmen, the negative utility for any particular decision-making herdsman is only a fraction of -1. Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another; and another.... But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.

Hardin's formulation has been the subject of extensive analysis and critique. At its core, the tragedy of the commons allegory illustrates a standard externality problem: each individual rationally maximizes his or her private welfare without accounting for external costs, i.e., the costs imposed on others.

Avoiding tragedy seems to require collective action to manage use of the shared resource. Simply put, unconstrained consumption is not sustainable, and thus, constraints must be introduced if the resource is to be sustained.

What should the constraints consist of? Hardin recognized two (top-down) solutions: government regulation and privatization. Government can constrain consumption by directly managing or regulating use of the shared resource. Alternatively, government can establish a system of private property rights delineating ownership of the resource. The former presumes that the government will take into account the aggregate effects and manage use of the resource efficiently over time, and the latter presumes that well-defined private property rights will facilitate market exchanges and lead to an efficient allocation of access and use rights, and consequently, efficient management of the resource over time (Demsetz, 1967). Both approaches eliminate the commons; no longer do commoners freely choose for themselves how to manage a shared resource, for such freedom, Hardin claims, brings ruin to all.

Both approaches rely on collective action through government to introduce constraints. The approaches differ substantially in terms of the manner in which ongoing (month-to-month, day-to-day, minute-to-minute) resource allocation decisions are made.

I include the block quote because it is useful to see what Hardin actually said. Paraphrasing Hardin often leads to adjustments that obscure or improve Hardin's simple story.

In Coasian terms, it is a joint cost problem (Coase, 1960).

Electronic copy available at:
<https://ssrn.com/abstract=2252133>

Journal of Institutional Economics (forthcoming 2013)

The tragedy of the commons allegory became the starting point for examining common pool resource problems and solutions. Many analysts assumed the tragedy of the commons model described a normal problem (at least for common pool resources) and a binary solution set followed: To avoid tragedy, society must turn to government command-and-control (micro-management) or private property-enabled markets. Economists, political scientists, and many others analyzed and debated how well these two types of regulatory solutions work. Will command-and-control regulation by government lead to efficient outcomes or

would society be better off relying on private ordering by markets? Elinor Ostrom challenged the entire enterprise at its roots by asking two foundational sets of questions: First, how well does the tragedy of the commons allegory describe reality? Is it a useful theory for making predictions about real-world behavior of individuals sharing common pool resources? Does it describe a normal or exceptional situation? Does it provide a useful basis for choosing or designing regulatory solutions? Second, does the binary choice between government command-and-control regulation and private property-enabled markets reflect the full range of options? Are there alternative (bottom-up) institutions and/or means for collective action? Critically, the two sets of questions are related, particularly when one begins with the tragedy of the commons allegory. Hardin blurred resource system with resource management. In his allegory, the shared resource system is the pasture, and open access sharing among herders is the resource management or governance regime. As did many social scientists, Hardin made a series of assumptions with respect to both resource and resource management that limit the generalizability of his allegory. As Ostrom (2007: 15183) explained: Hardin envisioned a pasture open to all in which each herder received a direct benefit from adding animals to graze on the pasture and suffered only delayed costs from overgrazing. Translating his metaphor into a theory requires five assumptions: (i) the resource system is a pasture; (ii) no governance system is present related to the resource system; (iii) the mobile individual resource units (the animals grazing on the pasture) can be identified and are the property of their owners and, when fattened, can be sold for cash; (iv) a sufficient number of users, given the size of the pasture, are using the pasture to adversely affect its long-term productivity; and (v) the resource users independently make decisions to maximize their own short-term returns. These five assumptions lead to a theoretical prediction of very high harvesting of the pasture grasses and severe overharvesting or destruction of the ecological system. Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013) Situations characterized by these assumptions, in which individuals independently make anonymous decisions and primarily focus on their own immediate payoffs, do tend to overharvest open-access resources. Researchers have repeatedly generated a tragedy of the commons in experimental laboratories when subjects make independent and anonymous decisions in a common-pool resource setting. Making one small change in the structure of laboratory experiments, a change that is predicted by game theory to make no difference in the predicted outcome, has repeatedly had major impacts on interactions and outcomes. Simply enabling subjects to engage in face-to-face communication between decision rounds enables them to approach socially optimal harvesting levels rather than severely overharvesting the commons. In the face-to-face discussions, participants tend to discuss what they all should do and build norms to encourage conformance.⁵ Note that when the assumptions hold and fully describe the resource setting, the theory's predictions may be useful. But this is exceptional. Reality is considerably more complex. The tragedy of the commons allegory rarely describes shared resource settings in a sufficiently complete manner as to qualify as a useful theory for making predictions or prescribing regulatory solutions. More is needed. Of course, it may be convenient to work within the confines of the allegory or model and perhaps

to assume that reality conforms to those confines because doing so makes analysis intractable and leads to a well-defined problem and possible solutions to compare and evaluate. But this is a fundamental mistake and an example of distorting reductionism. It can lead the analyst to miss what is most important and focus on what is least relevant. As Ostrom (2007) explained in the quote above, a slight change, which takes you outside the confines of the model, gives rise to solutions that completely escaped attention and would not be predicted to be relevant. Relaxing one of the assumptions, or just recognizing that some other factor is relevant to the situation, can change everything; cooperation to avoid tragedy becomes theoretically feasible without resort to one of the two solutions. As is now well understood in the field of institutional economics generally, community management, social norms, and other

Ostrom (2000) also critiqued reliance on the rational actor model when analyzing collective action and social dilemmas. After establishing a series of well-substantiated facts about human behavior based on extensive fieldwork: I believe that one is forced by these well-substantiated facts to adopt a more eclectic (and classical) view of human behavior (Ostrom, 2000: 141). She developed a second-generation model of rationality in which humans are complex, fallible learners who seek to do as well as they can given the constraints that they face and who are able to learn heuristics, norms, rules, and how to craft rules to improve achieved outcomes (Ostrom, 1998: 9). The second-generation model of rationality predicts that reciprocity, reputation, and trust as core relationships can lead to increased net benefits (Ostrom, 1998: 13). This theoretical model identifies individual attributes that are particularly important in explaining behavior in social dilemmas: these attributes include [1] the expectations individuals have about others's behavior (trust), [2] the norms individuals learn from socialization and life's experiences (reciprocity), and [3] the identities individuals create that project their intentions and norms (reputation) (Ostrom, 1998: 14). Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013) 6 Institutional arrangements are relevant solutions that can and often do outperform government regulation and market regulation. Ostrom's contribution goes well beyond recognizing the limits of models and acknowledging what is theoretically feasible. While it is important to understand Ostrom's concerns about model-induced myopia, it is equally if not more important to appreciate how she responded to those concerns. In *Governing The Commons: The Evolution Of Institutions For Collective Action*, for example, Ostrom (1990) explained how models such as the tragedy of the commons lead to myopic analysis of solutions and policy prescriptions. She suggested that neither the Leviathan (government regulation) nor Privatization (market regulation) is a panacea, and that model-induced myopia leads analysts to ignore alternative institutional arrangements that may be more effective tools for governance. But that is merely the beginning literally, chapter one of the book (Ostrom, 1990). Ostrom was a scientist. Her response to concerns about model-induced myopia was to do the scientific work of systematically studying actual resource systems and governance institutions. Over decades, Ostrom demonstrated through a rich empirical program how self-organized community governance often is an effective alternative for a wide range of shared resources. In some contexts, communities can and do solve tragedy of the commons, collective action, and other

related resource management problems without (turning to) government regulation or market-driven allocation as a panacea. They do so in a variety of ways, often relying on informal mechanisms for coordinating behavior. Community solutions do not always succeed or always fail; they sometimes succeed and sometimes fail. The temptation to seek out regulatory panaceas based on universal models, whether through private property, state action, or even notions of community, must be resisted in favor of a more nuanced approach (Madison, Frischmann and Strandburg, 2010a: 676). Context matters. Recognizing that people sometimes cooperate effectively and build institutions to enable sustainable shared use of common pool resources opened up the solution space and focused scholarly attention on complexity, context, communities, and institutions. This broader field of vision not only brought informal institutions into view and encouraged their systematic study, but it also improved our understanding of formal institutions by revealing the many different ways that government, market, and community institutions depend on each other to be successful. And it yielded two significant lessons, one substantive and one methodological.

Ostrom's Substantive Lesson:

As explored in a recent book, Ostrom's vision allows us to appreciate that government regulation of shared environmental resources does not replace or eliminate the commons altogether for that would be the true tragedy! Rather, in many cases, government regulation constructs a semi-commons where a narrow range of resource users/uses are constrained in order to sustain freedom in the commons for a wide range of other resource users/uses (Frischmann, 2012). Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013) Embrace complexity and context for simply, reality. There is tremendous value in systematically studying actual contexts that present potential tragedies and institutional arrangements aimed at averting tragedies. Be wary of model-induced myopia, supposed panaceas, and binary thinking. The deep problem with Hardin's tragedy of the commons allegory is not the allegory itself or its translation into a model or even a theory about how people might externalize costs in specific settings. The deep problem is the myopia that the model induced and the binary government-or-market thinking that followed. We consistently make the mistake of thinking in binary terms, individual or social, private or public, market or government. This leads to great distortions in our perceptions about the world and the plans we make. Reality is much more complicated. Standing alone, this lesson may be underwhelming, or perhaps even offensive to the scholar. You might be thinking, This is not a lesson. We all know that studying reality beats studying fictitious scenarios that do not match reality. Naturally, the next question is how should one go about studying reality? This leads to the second lesson.

Ostrom's Methodological Lesson: Embrace systematic, evolutionary learning through various interdisciplinary methodologies, theories, and empirical approaches, including case studies. There is tremendous value in a research framework that facilitates such learning while itself being subject to adaptation and refinement over time. Ostrom did not presume community based institutions were successful or ubiquitous. Community based institutions required systematic study. To facilitate research on these institutions across diverse resource systems, Ostrom worked for decades on developing a scientific approach to studying and evaluating institutions. She devoted incredible energy to

methodology, bridging disciplines, and enabling systematic, collaborative social science. To systematize research, she developed the Institutional Analysis and Development (IAD) framework. It encourages interdisciplinary research and seeks to avoid path dependencies from

The risk of model-induced myopia that Ostrom identified also provides a strong basis for taking a pluralistic approach to thinking about, and teaching, economics, especially if one cannot go out and study reality as Ostrom did. I discuss the IAD framework as a prominent example, but the reader should understand that Ostrom extended her ideas to the development of a more complex framework for the analysis of Social-Ecological Systems (Ostrom, 2009). Moreover, even when applying the IAD framework, the specific context shaped the research protocols. For example, as reported in Hayes and Ostrom (2005), Ostrom and colleagues associated with the Center for the Study of Institutions, Population, and Environmental Change (CIPEC) and the Workshop in Political Theory and Policy Analysis, both at Indiana University, developed a complex question-based framework tailored for analyzing forests:

Our research team spent two years developing a series of ten protocols that enable scholars to examine the impact of diverse ways of owning and governing forests (such as individual ownership, joint ownership by a

Electronic copy available at: <https://ssrn.com/abstract=2252133>

Journal of Institutional Economics (forthcoming 2013)

Interdisciplinary or methodological blinders, problems akin to the model-induced myopia discussed above. The IAD framework structures a common set of research questions to apply across diverse contexts. Ostrom (2005: 28-29) explained the relationships between a research framework, theories, and models:

The development and use of a general framework helps to identify the elements (and the relationships among these elements) that one needs to consider for institutional analysis. Frameworks . . . provide the most general set of variables that should be used to analyze all types of settings relevant for the framework. . . . The development and use of theories enable the analyst to specify which components of a framework are relevant for certain kinds of questions and to make broad working assumptions about these elements. Thus, theories focus on parts of a framework and make specific assumptions that are necessary for an analyst to diagnose a phenomenon, explain its processes, and predict outcomes. . . . Microeconomic theory, game theory, transaction cost theory, social choice theory, public choice, constitutional and covenantal theory, and theories of public goods and common-pool resources are all compatible with the IAD framework (2006).

The development and use of models make precise assumptions about a limited set of parameters and variables. Logic, mathematics, game theory models, experimentation and simulation, and other means are used to explore the consequences of these assumptions systematically on a limited set of outcomes. Multiple models are compatible with most theories. . . . The framework-driven approach is functionalist. It seeks to integrate theoretical and empirical research in coherent manner. Critically, Ostrom did not reject theories or models, but instead embraced the idea that different theories and models could work better for some observed phenomena than for others.

The IAD framework aims to systematize research efforts by facilitating a more rigorous evaluation by matching and testing of theories and models with observed phenomena, and most generally, enable learning over time (Madison, Frischmann and Strandburg, 2010a: 678). It depends heavily on empirical data, and consequently, on a systematic approach to

gathering data. The IAD framework identifies the most general set of variables that should be used to analyze all types of settings relevant for the framework and divides the investigation of such variables into groups. The first group is exogenous variables and includes biophysical characteristics, community attributes, and rules-in-use (or governance mechanisms). With respect to the community, and different forms of government ownership) on investment, harvesting, protection, and managing activities and their consequences on forest conditions, including biodiversity (Hayes and Ostrom, 2005: 603–604). She did reject the idea of a one-size-fits-all theory. The following four paragraphs are adapted from Madison, Frischmann and Strandburg (2010a: 678–680). Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013) analysis of a particular situation, these attributes of a commons are fixed. In the case of the lobster fishery, for example, these attributes might include the relevant biological characteristics of lobsters, such as the rates at which they age and reproduce; attributes of the community of fishermen, such as the proximity in which they live to others, the existence of familial relationships, and the skill sets needed for lobster fishing; and the rules explicit or informal that govern fishing. The second group is the action arena, which refers to the social space where participants with diverse preferences interact, exchange goods and services, solve problems, dominate one another, or fight (among the many things that individuals do in action arenas) (Ostrom, 2005: 14). In other words, the action arena is the context in which the exogenous variables combine in particular instances, leading over time to observed patterns of interactions and outcomes. Ostrom's work emphasizes the diversity of possible combinations of exogenous variables that determine what actually happens in particular instances and, hence, the outcomes that result. The rules governing lobster fishing contribute to the activity's long-term sustainability, for example, but the patterns of interaction actually observed depend on the richness of the particular environment for lobsters, the degree to which rules are actually enforced, seasonal factors such as weather, and interaction with outside influences such as pollution and the state of the larger economy. Understanding the observed success or failure of a commons enterprise such as a lobster fishery may require accounting for all of these factors, even though it may turn out that outcomes are relatively impervious to some of them. The foundation of the framework-driven analysis is structuring questions in clusters about the exogenous variables, the action arena, and the patterns of interactions and outcomes. This approach aims to systematize data gathering across complex, diverse phenomena while remaining amenable to diverse disciplinary perspectives and empirical methodologies. One interesting aspect of the IAD framework is its accommodation of and heavy reliance on case studies. Case studies are an important component to the research program because case studies provide rich, detailed descriptions of institutional arrangements in context. In addition, case studies provide feedback for the research framework itself. Of course, case studies also slow

To implement the IAD framework, Ostrom and her collaborators employed a three-pronged approach: First, they engaged in a broad range of case studies of natural resource commons to form a basis for a bottom-up practice-based taxonomy of successful and unsuccessful approaches to resource management. Second, they developed

a framework, based on the initial case studies, for identifying the variables that are significant in determining the success or failure of a commons enterprise and of the viability of institutions in particular contexts. Third, they preserved flexibility in their framework so that it could be adapted and revised in response to learning derived from the case studies. Based on the information obtained by applying their framework to structured case studies, they developed theories and models for particular commons situations, designed experiments to test those theories, and advanced a set of design principles for successful natural resource commons (Madison, Frischmann and Strandburg, 2010a: 676-677). Electronic copy available at: <https://ssrn.com/abstract=2252133>

Journal of Institutional Economics (forthcoming 2013)

Things down, making the empirical work more laborious, contentious, and incremental. Arguably, this is a virtue. Good (social) scientific research often takes time. A framework-driven approach is particularly attractive for studying the complex interactions between ecological and social (institutional) systems because of the many different disciplines and methodologies that must be brought to bear if progress is to be made (Ostrom, 2009). Ostrom's embrace of complexity goes further than studying reality and adopting a framework to accommodate different theories and methodologies. She also embraced collaboration among different people, disciplines, and cultures. She worked hard to establish a common ground in the fractured academic world of the natural and social sciences (Becker and Ostrom, 1995: 114). Her work was forcefully interdisciplinary, and throughout her career, she called on various disciplines to remove their disciplinary blinders. In her Presidential Address to the American Political Science Association, for example, Ostrom called for expansion of the type of research methods regularly used in political science and suggested that more understanding is required across the social and biological sciences (Ostrom, 1998).

Ostrom recognized that studying commons requires a kind of commons of its own, an interdisciplinary community for sharing skills, knowledge, research, and experience. So she built one.

With an ad hoc group of scholars including political scientists, anthropologists, economists, historians, and natural resource managers she founded the International Association for the Study of the Commons.

She was the first President of the IASC. The IASC's three goals are

1. to encourage exchange of knowledge among diverse disciplines, areas, and resource types;
2. to foster mutual exchange of scholarship and practical experience; and
3. to promote appropriate institutional design.

In pursuit of these goals, the IASC hosts major international conferences, publishes The Commons Digest and the International Journal of the Commons, and engages in many other activities that promote knowledge sharing and build social capital and connections among those concerned with commons.

Ostrom's legacy is most vividly seen in the thousands of people around the world, in many different disciplines and professional settings, who consider themselves a part of the research commons she helped construct.

Actually, she built many. Of particular note, with her husband Vincent Ostrom, also a renowned political scientist, she founded the Workshop in Political Theory and Policy Analysis. The Workshop is an autonomous research center at Indiana University dedicated to the interdisciplinary, collaborative, and comparative study of institutions (see Indiana University Bloomington, 2008). In honor of the couple,

IU renamed the workshop, The \n\nVincent and Elinor\nThe file is too long and its contents have been truncated.\n", "title": "Week 1_Two Enduring Lessons from Elinor Ostrom.pdf", "tether_id": null, "status": "finished_successfully", "end_turn": null, "weight": 1.0, "metadata": {"command": "context_stuff", "is_visually_hidden_from_conversation": true, "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "parent_id": "abecb08b-5001-46ea-8e6e-772018a9bea6", "request_id": "87edaalc0eb34bdc-MXP", "timestamp_": "absolute"}, "recipient": "all", "channel": null, "parent": "abecb08b-5001-46ea-8e6e-772018a9bea6", "children": [{"c2f4e5df-feac-4451-993e-0effce3e38b1"}], "c2f4e5df-feac-4451-993e-0effce3e38b1": {"id": "c2f4e5df-feac-4451-993e-0effce3e38b1", "message": {"id": "c2f4e5df-feac-4451-993e-0effce3e38b1", "author": {"role": "tool", "name": "myfiles_browser", "metadata": {}}, "create_time": 1714879983.519038, "update_time": null, "content": {"content_type": "text", "parts": ["\nPlease remember to search the user's documents if an answer to their question is not contained in the above snippets.\n"]}, "status": "finished_successfully", "end_turn": null, "weight": 1.0, "metadata": {"is_visually_hidden_from_conversation": true, "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "pad": "AAA", "parent_id": "9624b7b7-0916-4ba7-89ee-9cee21fd269b", "request_id": "87edaalc0eb34bdc-MXP", "timestamp_": "absolute"}, "recipient": "all", "channel": null, "parent": "9624b7b7-0916-4ba7-89ee-9cee21fd269b", "children": [{"fe2d6eaa-1c35-4b2b-8268-6e5e604a703e"}], "fe2d6eaa-1c35-4b2b-8268-6e5e604a703e": {"id": "fe2d6eaa-1c35-4b2b-8268-6e5e604a703e", "message": {"id": "fe2d6eaa-1c35-4b2b-8268-6e5e604a703e", "author": {"role": "assistant", "name": null, "metadata": {}}, "create_time": 1714879983.519274, "update_time": null, "content": {"content_type": "text", "parts": ["Priscilla, your reflection on the eco-footprint of electric vehicles (EVs) invites a deeper consideration of Hardin's 'Tragedy of the Commons' and Ostrom's principles of community governance. Hardin's theory suggests that without regulation, individuals acting in self-interest can deplete shared resources, leading to overall detriment. This applies to the energy sources powering EVs\u2014if the collective shift to EVs results in heightened demand on non-renewable energy grids, then the supposed environmental benefits are undermined. Here, the common resource (clean air and climate stability) risks being depleted by individual actions (increased electricity demand from EVs powered by fossil fuel-driven grids).\n\nOstrom's community governance approach offers a way forward. She emphasizes that local solutions and community management can effectively manage shared resources, diverging from Hardin's assumption of inevitable tragedy. This implies that localized, community-driven initiatives to power EV charging infrastructure with renewable energy could mitigate the broader ecological impact, aligning with Ostrom's vision of sustainable resource management through collective action and local governance.\n\nApplying these theories, we see that simply adopting EVs isn't enough; the transition must be part of a broader shift towards renewable energy in local grids, emphasizing community engagement and policy changes. This approach not only aligns with Ostrom's principles but could also foster more sustainable practices and a realignment of energy policies at the community level.\n\nConsidering this, how do you think local communities can be engaged to support the transition to renewable energy, particularly in areas heavily reliant on EVs?"]}, "status": "finished_successfully", "end_turn": true, "weight": 1.0, "metadata": {"finish_details": {"type": "stop", "stop_tokens": [100260]}, "citations": [], "gizmo_id": null, "is_complete": true, "message_type":

```

null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "pad":
"AAAAAAAAAAAAAAAAAAAAAAAAAAAA", "parent_id": "c2f4e5df-feac-4451-993e-0effce3e38b1",
"request_id": "87edaa1c0eb34bdc-MXP", "timestamp_": "absolute", "recipient": "all",
"channel": null}, "parent": "c2f4e5df-feac-4451-993e-0effce3e38b1", "children":
["aaa234e4-dca9-4090-88e4-f60b33678f25"]}, "aaa234e4-dca9-4090-88e4-f60b33678f25":
{"id": "aaa234e4-dca9-4090-88e4-f60b33678f25", "message": {"id": "aaa234e4-dca9-4090-
88e4-f60b33678f25", "author": {"role": "user", "name": null, "metadata": {}},
"create_time": 1714880188.101699, "update_time": null, "content": {"content_type":
"text", "parts": ["your reflection on the eco-footprint of electric vehicles (EVs)
invites a deeper consideration of Hardin's 'Tragedy of the Commons' and
Ostrom's principles of community governance. Hardin's theory suggests that
without regulation, individuals acting in self-interest can deplete shared resources,
leading to overall detriment. This applies to the energy sources powering EVs\u2014if
the collective shift to EVs results in heightened demand on non-renewable energy grids,
then the supposed environmental benefits are undermined. Here, the common resource
(clean air and climate stability) risks being depleted by individual actions
(increased electricity demand from EVs powered by fossil fuel-driven grids).\n\nThis
paragraph is about enough, can you simplify and condense the rest of the response and
keep the question at the end? "]}}, "status": "finished_successfully", "end_turn": null,
"weight": 1.0, "metadata": {"request_id": "87edafb61e7c83a0-MXP", "timestamp_":
"absolute", "message_type": null}, "recipient": "all", "channel": null}, "parent":
"fe2d6eaa-1c35-4b2b-8268-6e5e604a703e", "children": ["8b048b64-d93e-41b3-bc77-
0e8efdcdddee8"]}, "8b048b64-d93e-41b3-bc77-0e8efdcdddee8": {"id": "8b048b64-d93e-41b3-
bc77-0e8efdcdddee8", "message": {"id": "8b048b64-d93e-41b3-bc77-0e8efdcdddee8", "author":
{"role": "assistant", "name": null, "metadata": {}}, "create_time": 1714880199.658608,
"update_time": null, "content": {"content_type": "text", "parts": ["Certainly! Garrett
Hardin's 'Tragedy of the Commons' suggests that individuals, acting
based on self-interest without regulatory oversight, can overuse and deplete shared
resources. This theory applies to the adoption of electric vehicles (EVs). If EVs draw
power from grids reliant on non-renewable energy sources, their environmental benefits
are compromised, potentially worsening the shared resource of clean air and climate
stability. \n\nElinor Ostrom's principles of community governance suggest that
local, community-driven initiatives could manage shared resources more sustainably. By
engaging local communities in transitioning to renewable energy sources for EVs, we
can align individual actions with collective environmental benefits.\n\nHow do you
think local communities can be effectively engaged to support the shift toward
renewable energy, particularly in areas with a high reliance on EVs?"]}, "status":
"finished_successfully", "end_turn": true
, "weight": 1.0, "metadata": {"finish_details": {"type": "stop", "stop_tokens":
[100260]}}, "citations": [], "gizmo_id": null, "is_complete": true, "message_type":
null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "pad": "AAAAAAAAAAAAAAAA",
"parent_id": "aaa234e4-dca9-4090-88e4-f60b33678f25", "request_id": "87edafb61e7c83a0-
MXP", "timestamp_": "absolute", "recipient": "all", "channel": null}, "parent":
"aaa234e4-dca9-4090-88e4-f60b33678f25", "children": []}, "moderation_results": [],
"current_node": "8b048b64-d93e-41b3-bc77-0e8efdcdddee8", "plugin_ids": null,
"conversation_id": "9c032b03-3bb0-49d1-a93f-314da48e49dc", "conversation_template_id":
null, "gizmo_id": null, "is_archived": false, "safe_urls":
["http://dx.doi.org/10.1016/j.erss.2017.05.023",
"http://dx.doi.org/10.1126/science.aam6284", "https://ssrn.com/abstract=2252133",

```

["http://dx.doi.org/10.1002/wcc.62"](http://dx.doi.org/10.1002/wcc.62), ["http://www.elsevier.com/locate/erss"](http://www.elsevier.com/locate/erss),
["http://refhub.elsevier.com/S2214-6296\(17"](http://refhub.elsevier.com/S2214-6296(17),
["https://doi.org/10.1016/j.erss.2017.05.023"](https://doi.org/10.1016/j.erss.2017.05.023),
["http://dx.doi.org/10.1016/j.endeavour.2016.10.007"](http://dx.doi.org/10.1016/j.endeavour.2016.10.007),
["http://ssrn.com/abstract=2252133"](http://ssrn.com/abstract=2252133), ["http://dx.doi.org/"](http://dx.doi.org/),
["http://ssrn.com/abstract=2252133Electronic"](http://ssrn.com/abstract=2252133Electronic),
["http://dx.doi.org/10.1016/j.apenergy.2016.07.131"](http://dx.doi.org/10.1016/j.apenergy.2016.07.131),
["http://creativecommons.org/licenses/by/4.0/"](http://creativecommons.org/licenses/by/4.0/), ["http://dx.doi.org/10"](http://dx.doi.org/10),
["http://crossmark.crossref.org/dialog/?doi=10.1016/j.erss.2017.05.023&domain=pdf"](http://crossmark.crossref.org/dialog/?doi=10.1016/j.erss.2017.05.023&domain=pdf),
["http://esa.un.org/unpp"](http://esa.un.org/unpp), ["http://dx.doi.org/10.1038/nature08017"](http://dx.doi.org/10.1038/nature08017),
["http://dx.doi.org/10.1073/pnas.1221978110"](http://dx.doi.org/10.1073/pnas.1221978110),
["http://www.sciencedirect.com/science/journal/22146296"](http://www.sciencedirect.com/science/journal/22146296)], "default_model_slug": "gpt-4", "conversation_origin": null, "voice": null, "async_status": null, "id": "9c032b03-3bb0-49d1-a93f-314da48e49dc", {"title": "Sustainable Olive Oil Production", "create_time": 1714755316.627817, "update_time": 1714755357.278252, "mapping": {"1ecf538b-b324-437f-8f3e-b35ccd41847b": {"id": "1ecf538b-b324-437f-8f3e-b35ccd41847b", "message": {"id": "1ecf538b-b324-437f-8f3e-b35ccd41847b", "author": {"role": "system", "name": null, "metadata": {}}, "create_time": null, "update_time": null, "content": {"content_type": "text", "parts": [""]}, "status": "finished_successfully", "end_turn": true, "weight": 0.0, "metadata": {"is_visually_hidden_from_conversation": true}, "recipient": "all", "channel": null}, "parent": "aaal444a-4c19-46fd-be18-f02e761244ae", "children": [{"aaac2c892-ce58-4932-9097-04147ff9e534"}], "aaal444a-4c19-46fd-be18-f02e761244ae": {"id": "aaal444a-4c19-46fd-be18-f02e761244ae", "message": null, "parent": null, "children": [{"1ecf538b-b324-437f-8f3e-b35ccd41847b"}], "aaac2c892-ce58-4932-9097-04147ff9e534": {"id": "aaac2c892-ce58-4932-9097-04147ff9e534", "message": {"id": "aaac2c892-ce58-4932-9097-04147ff9e534", "author": {"role": "user", "name": null, "metadata": {}}, "create_time": 1714755316.629445, "update_time": null, "content": {"content_type": "text", "parts": [" Choose a real-world example in industry, manufacturing, or in a specific sector (i.e., agricultural company producing palm oil or foreign labor conditions for a U.S. brand of clothing) and research their sustainability measures, transparency, and supply chain management. Do they have a sustainability or ethical production rating? Where could they improve their production or manufacturing? Make an argument for or against implementing additional sustainability measures. Would the benefits to the environment or to people outweigh the burden of implementing these measures? How would they be enforced? Describe briefly, the complexity or cost that may be involved in the systems change necessary to bring the company or sector into sustainability.\n\n\nAzienda Agricola Vittorio Cassini, an olive oil production company based in Italy.\nAzienda Agricola Vittorio Cassini: Sustainable Olive Oil Production\nSustainability and Ethical Rating:\nStandard Ethics Rating (SER): Azienda Agricola Vittorio Cassini can seek a Standard Ethics Rating, which provides a comparable and standardized solicited rating system for sustainability. This rating aligns with guidelines promoted by the EU, OECD, and the UN 1.\nEthical Practices: Azienda\u2019s commitment to producing high-quality olive oil using traditional methods demonstrates ethical considerations.\nAreas for Improvement:\nEnergy Efficiency: Azienda can explore energy-saving measures in its production processes. Implementing renewable energy sources or optimizing energy use can reduce the company\u2019s carbon footprint.\nWater Management: Olive cultivation demands substantial water. Azienda could invest in efficient irrigation systems,

rainwater harvesting, and water recycling.\nBiodiversity Conservation: Encouraging biodiversity within olive groves enhances ecosystem resilience. Azienda can promote native plant species and protect natural habitats.\nBenefits vs. Burden:\nBenefits:\nEnvironmental: Reduced emissions, water conservation, and soil health.\nSocial: Fair wages, community engagement, and support for local farmers.\nBurden:\nCost: Initial investments in sustainable practices (e.g., solar panels, water-efficient equipment).\nComplexity: Adapting existing systems and supply chains requires planning and coordination.\nEnforcement and Complexity:\nCertification: Seeking third-party certifications (e.g., organic, Fair Trade) validates Azienda's sustainable practices.\nSupply Chain Audits: Regular audits ensure adherence to sustainability standards.\nComplexity and Cost: Varies based on Azienda's existing infrastructure and willingness to invest in sustainability.\n\nIn summary, Azienda Agricola Vittorio Cassini's commitment to sustainability benefits both the environment and local communities. By implementing additional measures, Azienda can lead by example and inspire positive change across the olive oil sector. The initial burden is outweighed by the long-term gains for people, planet, and prosperity.

1: Standard Ethics – Solicited Sustainability Rating

1: Rewrite the passage above to better answer the question above in a University discussion board assignment format/mode. Include some quotes or references from the attached material in your rewritten response.

{}], "status": "finished_successfully", "end_turn": null, "weight": 1.0, "metadata": {"attachments": [{"id": "file-QgGXvHs1K7H5q6GaBij0N90y", "size": 682568, "name": "Lombardo et al. - 2021 - Sustainability Certification, a New Path of Value.pdf", "mime_type": "application/pdf"}, {"id": "file-qSYqiSiNaul8BedGo7lZ1Ky4", "size": 3050319, "name": "Week 1_A behavioral approach to the rational choice theory of collective action.pdf", "mime_type": "application/pdf"}, {"id": "file-kY5KZqqCLsf87fkcfF02e0Bt", "size": 140384, "name": "Week 1_Beyond the Tragedy of the Commons.pdf", "mime_type": "application/pdf"}, {"id": "file-ElmhTxfdGAdmNljNA4ulilyD", "size": 7500241, "name": "Sustainable Resource Management Global Trends, Visions and Policies (Stefan Bringezu Raimund Bleischwitz) (Z-Library).pdf", "mime_type": "application/pdf"}, {"id": "file-mrPVQDMfIU0exlGC6VME4ga", "size": 645483, "name": "Week 1_Two Enduring Lessons from Elinor Ostrom.pdf", "mime_type": "application/pdf"}, {"id": "file-cFP6zEnYNmOK2G4zIU000X6t", "size": 322752, "name": "Week 1_Growth and Collapse of a Resource System.pdf", "mime_type": "application/pdf"}]}, "request_id": "87e1c715391a83b5-MXP", "timestamp": "absolute", "message_type": null, "recipient": "all", "channel": null, "parent": "1ecf538b-b324-437f-8f3e-b35ccd41847b", "children": [{"id": "f74ad7b6-cd3a-4f6e-95d1-40879ae3fcde"}], "f74ad7b6-cd3a-4f6e-95d1-40879ae3fcde": {"id": "f74ad7b6-cd3a-4f6e-95d1-40879ae3fcde", "message": {"id": "f74ad7b6-cd3a-4f6e-95d1-40879ae3fcde", "author": {"role": "tool", "name": "myfiles_browser", "metadata": {}}, "create_time": 1714755356.226733, "update_time": null, "content": {"content_type": "tether_quote", "url": "file-qSYqiSiNaul8BedGo7lZ1Ky4", "domain": "Week 1_A behavioral approach to the rational choice theory of collective action.pdf", "text": "\nAmerican Political Science Review Vol. 92, No.1 March 1998\n\nA Behavioral Approach to the Rational Choice Theory of Collective Action\n\nPresidential Address, American Political Science Association, 1997\n\nELINOR OSTROM Indiana University\n\nTextensive empirical evidence and theoretical developments in multiple disciplines stimulate a need to\n\nexpand the range of rational choice models to be used as a foundation for the study of social\n\nproblems and dilemmas and collective action. After an introduction to the problem of overcoming social dilemmas\n\nthrough collective action, the remainder of this

article is divided into six sections. The first briefly reviews the theoretical predictions of currently accepted rational choice theory related to social dilemmas. The second section summarizes the challenges to the sole reliance on a complete model of rationality presented by extensive experimental research. In the third section, I discuss two major empirical findings that begin to show how individuals achieve results that are "better than rational" by building conditions where reciprocity, reputation and trust can help to overcome the strong temptations of short-run self-interest. The fourth section raises the possibility of developing second-generation models of rationality, the fifth section develops an initial theoretical scenario, and the final section concludes by examining the implications of placing reciprocity, reputation and trust at the core of an empirically tested, behavioral theory of collective action.

We are hand-waving at our central questions. I am afraid that we do a lot of hand-waving. Let me start with a provocative statement. You would not be reading this article if it were not for some of our ancestors learning how to undertake collective action to solve social dilemmas. Successive generations have added to the stock of everyday knowledge about how to instill productive norms of behavior in their children and to craft rules to support collective action that produces public goods and avoids "tragedies of the commons." What our ancestors and contemporaries have learned about engaging in collective action for mutual defense, child rearing, and survival is not, however, understood or explained by the extant theory of collective action.

The lessons of effective collective action are not simple as is obvious from human history and the immense tragedies that humans have endured, as well as the successes we have realized. As global relationships become even more intricately intertwined and complex, however, our survival becomes more dependent on empirically grounded scientific understanding. We have not yet developed a behavioral theory of collective action based on models of the individual consistent with empirical evidence about how individuals make decisions in social-dilemma situations. A behavioral commitment to theory grounded in empirical inquiry is essential if we are to understand such basic questions as why face-to-face communication so consistently enhances cooperation in social dilemmas nor how structural variables facilitate or impede effective collective action.

Social dilemmas occur whenever individuals in interdependent situations face choices in which the maximization of short-term self-interest yields outcomes leaving all participants worse off than feasible alternatives. In a public-good dilemma, for example, all those who would benefit from the provision of a public good such as pollution control, radio broadcasts or weather forecasting find it costly to contribute and would prefer others to pay for the good instead. If everyone follows the equilibrium strategy, then the good is not provided or is underprovided. Yet, everyone would be better off if everyone were to contribute.

Social dilemmas are found in all aspects of life, leading to momentous decisions affecting war and peace as well as the mundane relationships of keeping promises in everyday life. Social dilemmas are called by many names, including the public-good or collective-good problem (Olson 1965, P. Samuelson 1954), shirk-ning (Alchian and Demsetz 1972), the free-rider problem (Edney 1979, Grossman and Hart 1980), moral hazard (Holmstrom 1982), the credible commitment dilemma (Williams, Collins, and Lichbach 1997), generalized social exchange (Eckhardt 1974; Emerson 1972a),

Yet, the theory of collective action is the central subject of political science. It is the core of the justification for the state. Collective-action problems pervade international relations,

face legislators when devising public budgets, permeate public bureaucracies, and are at the core of explanations of voting, interest group formation, and citizen control of governments in a democracy. If political scientists do not have an empirically grounded theory of collective action, then Elinor Ostrom is Arthur F. Bentley Professor of Political Science; Co-Director, Workshop in Political Theory and Policy Analysis; and Co-Director, Center for the Study of Institutions, Population, and Environmental Change; Indiana University, Bloomington, IN 47408-3895. The author gratefully acknowledges the support of the National Science Foundation (Grant #SBR-9319835 and SBR-9521918), the Ford Foundation, the Bradley Foundation, and the MacArthur Foundation. My heartiest thanks go to James Alt Jose Apesteguia, Patrick Brandt, Kathryn Firmin-Sellers, Roy Gardner, Derek Kau- neckis, Fabrice Lehoucq, Margaret Levi, Thomas Lyon, Tony Mate- njczyk, Mike McGinnis, Trudi Miller, John Orbell, Vincent Ostrom, Eric Rasmusen David Schmidt, Sujai Shivakumar, Vernon Smith, Catherine Tucker, George Varughese, Jimmy Walker, John Williams, Rick Wilson, Toshio Yamagishi, and Xin Zhang for their comments on earlier drafts and to Patty Dalecki for all her excellent editorial and moral support. The term "tragedy of the commons" refers to the problem that common-pool resources, such as oceans, lakes, forests, irrigation systems, and grazing lands can easily be overused or destroyed if property rights to these resources are not well defined (see Hardin 1968). A Behavioral Approach to the Rational Choice Theory of Collective Action_ Presidential Address, American Political Science Association, 1997 on JSTOR __ Reader View

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

"title": "Week 1_A behavioral approach to the rational choice theory of collective action.pdf", "tether_id": null, "status": "finished_successfully", "end_turn": null, "weight": 1.0, "metadata": {"command": "context_stuff", "is_visually_hidden_from_conversation": true, "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "parent_id": "aaa2c892-ce58-4932-9097-04147ff9e534", "request_id": "87elc715391a83b5-MXP", "timestamp_": "absolute"}, "recipient": "all", "channel": null, "parent": "aaa2c892-ce58-4932-9097-04147ff9e534", "children": [{"id": "f5230846-4cc8-41cf-8748-4ald4a783c50"}], "f5230846-4cc8-41cf-8748-4ald4a783c50": {"id": "f5230846-4cc8-41cf-8748-4ald4a783c50", "message": {"id": "f5230846-4cc8-41cf-8748-4ald4a783c50", "author": {"role": "tool", "name": "myfiles_browser", "metadata": {}}, "create_time": 1714755356.226918, "update_time": null, "content": {"content_type": "tether_quote", "url": "file-kY5KZqqCLsf87fkcfF02e0Bt", "domain": "Week 1_Beyond the Tragedy of the Commons.pdf", "text": "\nContents lists available at ScienceDirect\n\nEnergy Research & Social Science\n\njournal homepage: www.elsevier.com/locate/erss\n\nPerspectives\n\nBeyond the tragedy of the commons: Reframing effective climate change governance\n\nAnthony Patt\nETH Z\u00fcrich, Switzerland\n\nARTICLE INFO\n\nKeywords:\nClimate policy\nTragedy of the commons\nGlobal commons problem\nTechnological transitions\n\nABSTRACT\n\nThe tragedy of the commons provides a powerful narrative for a class of environmental problems, and serves to frame them in a way that allows people to identify effective solution strategies. But the problem frame also rests on a set of factual and value-based assumptions, and is inappropriate to guide decision-making when these assumptions are violated. The climate change mitigation challenge 2013 reducing greenhouse gas emissions, mainly from the energy sector, to limit global

warming to less than 1.5 or 2 °C violates these assumptions. Climate change requires us not to reduce, but to completely prohibit greenhouse gas emissions. Before any such prohibition is feasible, it is first essential to develop a clean energy system that can meet our basic needs. The main barriers to this are not economic, but rather are associated with evolving knowledge, networks, and institutions. Framing climate change in evolutionary terms can help us to appraise policy options more effectively, and ultimately identify those that get us where we need to go.

The tragedy of the commons

The biologist and ethnic nationalist Garrett Hardin wanted society to restrict people's reproductive freedom, and believed that only those parents who would raise their children the right way should be entitled to have babies [1,2]. To support this politically charged belief, Hardin developed an argument based on the idea of the tragedy of the commons, a game theoretic model involving farmers letting their cows graze on the communally owned village green [3]. Every farmer obtains the full benefit of placing an extra cow on the commons to graze, while suffering only a small share of the cost to the community as a whole, in terms of less grass being available to the other cows. Overgrazing is the inevitable equilibrium, unless the community as a whole steps in. Limiting the number of cows, and ideally allocating them to those farmers who can manage them most profitably, is the obvious solution. The lesson transferred well to the point Hardin was trying to make about people in his now famous article.

Today, few would use a tragedy of the commons framing, or related terms such as commons problem, common pool resource problem, or externalities problem, to describe the issue of human population growth. This is largely because the world has witnessed birth rates falling globally, on most continents to below replacement levels, as a result of factors Hardin didn't consider: the education of women, reductions in infant mortality, and urbanization [4,5]. But most analysts do use Hardin's idea to describe other environmental problems, most notably climate change, and based on this framing suggest a strategy similar to what Hardin advocated [6]. The framing may be appropriate for some of these problems, fisheries management being an example that comes to mind. But it is not appropriate for climate change, and the sooner we stop framing climate change in this way, the better.

As a starting point, it is worth considering what the key aspects of a commons problem actually are. Hardin himself described four, and these are as valid today as they were then. First, of course, there needs to be a common pool resource, such as the grass on a village green, or the global carrying capacity for people. Second, there needs to be a use of that resource, or an activity that depletes it, that is legitimate and valuable, accepted by society at large. In Hardin's model, we do want cows to graze on the village green, as long as they do so productively, just as we do want a planet that is home to people. In fact, because the use is so valuable, we want to ensure that it takes place in a manner that is both optimal and sustainable. Third, the common-pool nature of the resource has to be the thing that leads people to overuse or over-deplete the resource, to the point that is clearly suboptimal, perhaps even exceeding its sustainable limits. Fourth, there cannot be a technical solution. By this, Hardin meant that it is not possible to use technology to expand the resource in order to continually accommodate the growing use.

The tragedy of the commons acts as a problem frame. The effect of a problem frame is to take a complex issue which affects multiple values and can be considered from a variety of perspectives and to simplify it around one particular conceptualization, leading to one particular solution strategy [7]. In the

case of this framing, it is the third aspect

<http://dx.doi.org/10.1016/j.erss.2017.05.023> Received 16 May 2017; Accepted 18 May 2017

E-mail address: anthony.patt@usys.ethz.ch

Energy Research & Social Science 34 (2017) 1–13

Available online 27 May 2017

2214–6296/ 2017 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

<http://www.sciencedirect.com/science/journal/22146296> <http://www.elsevier.com/locate/erss> <http://dx.doi.org/10.1016/j.erss.2017.05.023> <mailto:anthony.patt@usys.ethz.ch> <https://doi.org/10.1016/j.erss.2017.05.023> <http://crossmark.crossref.org/dialog/?doi=10.1016/j.erss.2017.05.023&domain=pdf>

listed in the paragraph above that is crucial. The common-pool ownership structure, meaning that agents do not pay the full cost of their use, is seen as the driving force behind their overuse. Framing a problem as a tragedy of the commons automatically implies that if one could privatize the ownership structure, or make the agents pay the full costs to society of their use of the resource, then an optimal outcome would be achieved. In the case of a village green, the easy solution is to divide it up with fences, and have each subdivided plot belong to a single farmer. In the case of a resource that cannot be subdivided so easily, like the global carrying capacity for humans, then the solution is only slightly more complicated. Either one has to establish a limited number of rights to use the resource, and allocate these to people in advance, or one has to charge people ex post for their use of the resource. An important feature of the model is that the solution increases the resource's overall productivity. And that means that as long as the allocation mechanism or tax is fair, then reaching an agreement to privatize the use rights or internalize their costs should be politically feasible.

But the usefulness of such policy guidance depends on the underlying applicability of the problem frame. The presence of a common-pool resource does not guarantee that Hardin's solution strategy is the best; the problem frame ceases to provide useful guidance if any of the other three criteria are violated. A case that illustrates failure on the second of the four criteria is the act of murdering one's neighbor. This depletes the common pool resource of public safety, but murder is not an activity that we want, so we don't solve it by imposing a tax or allocating a limited number of permits. We prohibit it. To illustrate failure on the third criterion, drinking alcohol is a behavior that we tolerate in moderation, and even encourage in some situations, but when people get drunk and start breaking things, they become a public nuisance. Yet we don't believe that internalizing the cost of drunken behavior will get the person on the verge of intoxication to say no to another drink. So we address it by other means, including charging bartenders with cutting people off, and providing treatment programs for alcoholism. To illustrate failure on the fourth criterion, the local public school may be overcrowded, but we can solve this by enlarging the building and hiring more teachers. So we do that, rather than limiting the number of places available or imposing high school fees.

Failure on any of these criteria matters. Climate change fails on all three.

2. Why climate change fails the tragedy of the commons criteria

Many people see the 2015 Paris Agreement as representing a turning point in climate governance, but in fact the events that foreshadowed Paris occurred a decade prior to then, culminating in 2007. It was then that the idea of the 2 °C target gained popularity, based on risk management arguments, and was incorporated into a global action plan agreed to in

Bali, Indonesia, at the closing of a failed set of negotiations to extend or replace the Kyoto Protocol [8, 2013]. Paris built on this decision, and added an additional level of ambition by suggesting the desirability of limiting climate change to 1.5 °C. More importantly, Paris set up a process that could help countries to take the steps to achieve one or the other, in terms of a regular global stocktake, as well as a set of mechanisms to provide financial and capacity-building support to developing countries.

The one thing that the Paris Agreement does not include is a set of negotiated binding national targets, of the kind that are the heart of the Kyoto Protocol. In fact, the failed desire to include such binding targets is what led to the eight-year delay, starting in Bali. And yet this failure should not surprise us, for a simple reason. The tragedy of the commons framing suggests that negotiating binding targets should be politically infeasible, with the main hurdle being the identification of a mutually acceptable allocation rule for the net benefits. But this presupposes that the global target is one that will maximize the value to society of whatever activity it is that degrades the common pool resource. Partial decarbonization as per Kyoto could take place by eliminating inefficiencies in the energy system, and arguably could deliver immediate net economic benefits; negotiating the allocation rule took less than two years. Achieving the Paris targets of 2 °C or 1.5 °C, however, requires that net anthropogenic emissions of greenhouse gases into the atmosphere cease entirely in the second half of this century [11].

Finding immediate net benefits to allocate that are associated with a complete halting of emissions is more or less impossible, and so negotiating such an agreement required convincing people to pay attention to large benefits anticipated in the future, in some cases centuries hence [12, 8]. So the temperature target qualitatively changed the character of negotiations, making them far more difficult, arguably impossible. More fundamentally, the need to eliminate emissions entirely, essentially as soon as possible, makes those emissions something that society will no longer tolerate. So climate change fails the second of the four criteria Hardin identified, just like murder.

There has been another major change since about 2007, and that is the recognition that the medium-term costs of eliminating greenhouse gas emissions are likely to be trivial, and may in fact be negative, even before considering the long-term benefits from avoided climate impacts [13, 14]. What drove this recognition was the realization from the field of evolutionary economics that policies to expand renewable energy also make them cheaper [15, 16]. This fact has become especially salient lately, as the costs of supplying energy from some renewable resources have fallen to below those of fossil fuels [17], especially if one takes into account local environmental effects such as air pollution or water demand [18]. A study in the United States, for example, examined the avoided local and regional environmental impacts associated with installing wind and solar power instead of new coal capacity, and found the value of those impacts to be far larger than the difference in cost between the two technologies [19]. As another example, the costs to own and drive an electric car charged by wind or solar power are approaching parity with those of a conventional gasoline model, at least under some conditions [20].

These trends suggest two additional ways in which the tragedy of the commons framing fails for climate change. First, there is no longer a necessary misalignment of incentives between the emitters of greenhouse gases and society at large. Every country, with the possible exception of major oil and gas exporters, has reason to mitigate climate change and transform its national energy

sector away from fossil fuels, regardless of what other countries may do. Every household will soon have a financial incentive to stop burning oil and gas, regardless of what their neighbors do. So if fossil fuels are still in business, it will not be because of an unjust cost advantage, born from the existence of an externality. Climate change is like the example of public drunkenness: internalizing the cost will not change anything qualitatively. Second, it now appears that a technical solution does exist for climate change. Integrated assessment models suggest that by switching to non-fossil energy sources, we can continue to see global economic activity grow, at roughly the same pace, even as greenhouse gas emissions come to a halt [21]. Climate change is like enlarging the public school.

3. Framing today's challenge in evolutionary terms

But we still have a problem needing to be solved. Using electric cars as an example, a household may soon have a financial incentive to switch over from their gasoline model, but it will not do so unless there is a dense network of charging stations where they want to take long trips. At the same time, there is no business case to install such a network as long as the number of electric cars on the road remains low. This is a chicken and egg problem: you need a chicken to get an egg, but an egg to get a chicken. Similar problems exist across the energy sector. At the most general level, we need to prohibit greenhouse gas emissions, which almost certainly means prohibiting fossil fuels. But which comes first: prohibition, or clean energy? Before prohibition can be politically and socially feasible, we need a clean energy system that is good enough to sustain us. Yet given more than a century already spent improving and optimizing an energy system based on fossil fuels, the first steps towards a clean energy system are necessarily expensive, clumsy, and unreliable. Most of the improvements to the clean energy system built around new knowledge, networks, and institutions only come once we start relying on it. Progress can occur, but without policy intervention, it will be slow. It took millions of years to get a chicken when the starting point was a dinosaur. Accelerating evolution is the key challenge for climate policy. Just as the tragedy of the commons framing offered clear guidance in terms of the appropriate policy instruments, so too does an evolutionary framing, based on insights from the emerging scientific study of socio-technical transitions [22]. Our policy instruments need to be those that build the new knowledge, networks, and institutions that will enable a clean energy system to function smoothly and affordably, which is a prerequisite to phasing out fossil fuels. When we think about all of the policies that support renewable energy innovation and deployment state-sponsored R & D, tax credits or feed-in tariffs for project developers, and streamlined permitting processes for green infrastructure that is exactly what is going on. As they create a new system that is viable, these policies lay the groundwork for a second generation of sectoral regulations, already beginning to appear, which prevent new investment into fossil fuel infrastructure. If you frame climate change as an evolutionary problem, it is this sequence of policy instruments that makes the most sense [23].

The issue of how we frame climate change mitigation is important, precisely because the two framings point us in different directions with respect to policy. When there is a true tragedy of the commons, then neo-classical economics and game theory provide a solid basis to favor market-based instruments, those that allocate limited rights to deplete the resource or internalize the costs of doing so [24]. Confusion can arise, however, because

proponents of market-based instruments also suggest that these will provide the needed stimulus for innovation, promoting systemic change [25,26]. But just because these instruments are the best solution to one kind of problem does not mean they are very good or effective with respect to another. In fact, a growing literature shows that they aren't, and that the effective policies to stimulate a transition are those that directly support the development of new knowledge, networks, and institutions, directly addressing the barriers to systemic change [27]. The choice of how we frame climate change dictates the terms by which we evaluate the relative strengths and weaknesses of the different possible solution strategies. Judged by the appropriate criteria, market instruments are generally a poor fit.

The tragedy of the commons framing made sense at a time when we believed that people needed to adjust the energy system at the margins, and believed that the cost of doing so would be high. We no longer believe these things. The atmosphere may be a common pool resource, but using it as a place to put our greenhouse gas emissions is no longer something for which we have any long-term rights to allocate. To prohibit dumping our greenhouse gases there, we first need to accelerate a technological transition towards non-fossil sources of energy, for which the main barriers have to do with knowledge and networks, rather than an inherent difference in cost. Policies providing active and indirect governmental support for new technologies and technological systems can change the conditions that hold the new technologies back. In fact they have already done a great deal; they have led to a dramatic decline in the costs of key energy technologies, and contributed to the possibility that global emissions have already peaked. There is still more work to be done, and we can solve climate change if we build on what we have learned. At all costs, we should resist the temptation to reverse course because the policies don't fit one man's convenient story of too many cows on a village green.

Acknowledgment

Funding for the development of the ideas expressed in this article came from European Research Council Starting Grant number 313553.

References

- [1] G. Hardin, The tragedy of the commons, *Science* 162 (3859) (1968) 1243–1248.
- [2] J. Oakes, Garrett Hardin's tragic sense of life, *Sci. Publ. Eye* 40 (4) (2016) 238–247, <http://dx.doi.org/10.1016/j.endeavour.2016.10.007>.
- [3] J. Nash, Equilibrium points in N -person games, *Proc. Natl. Acad. Sci. U. S. A.* 36 (1950) 48–49.
- [4] United Nations Population Division, *World Population Prospects: The 2006 Revision*, United Nations Department of Economic and Social Affairs, 2007, <http://esa.un.org/unpp>.
- [5] W. Lutz, J. Crespo Cuaresma, W. Sanderson, The demography of educational attainment and economic growth, *Science* 319 (2008) 1047–1048.
- [6] R. Stavins, J. Zou, T. Brewer, M. Conte Grand, M. Elzen, M. den Finus, J. Gupta, N. Hoffmann, M. Lee, A. Michaelowa, M. Patterson, K. Ramakrishna, G. Wen, J. Wiener, H. Winkler, *International cooperation: agreements & instruments*, *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, UK and New York, USA, 2014, pp. 1001–1082.
- [7] D. Chong, J. Druckman, Framing theory, *Annu. Rev. Polit. Sci.* 10 (2007) 103–126.
- [8] T. Barker, The economics of avoiding dangerous climate change. An editorial essay on The Stern Review, *Clim. Change* 89 (3) (2008) 173.
- [9] K. Hasselmann, T. Barker, The Stern Review and the IPCC fourth assessment report: implications for interactions between policymakers and climate experts. An editorial essay, *Clim. Change* 89 (2008) 219–229.
- [10] S. Randalls, *History*

of the 2 °C climate target, Wiley Interdiscip. Rev. Clim. Change 11 (4) (2010) 598–605, <http://dx.doi.org/10.1002/wcc.62>. [11] M. Meinshausen, N. Meinshausen, W. Hare, S.C.B. Raper, K. Frieler, R. Knutti, D.J. Frame, M.R. Allen, Greenhouse-gas emission targets for limiting global warming to 2 °C, Nature 458 (7242) (2009) 1158–1162, <http://dx.doi.org/10.1038/nature08017>. [12] N. Stern, The Economics of Climate Change, Cambridge University Press, Cambridge, UK, 2007. [13] O. Edenhofer, N. Bauer, E. Kriegler, The impact of technological change on climate protection and welfare: insights from the model MIND, Ecol. Econ. 54 (2005) 277–292. [14] IPCC, Climate Change 2014: Mitigation of Climate Change. Working Group III Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, in: O. Edenhofer, R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eikemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel, J. Minx (Eds.), Cambridge University Press, Cambridge, UK and New York, USA, 2014. [15] W.B. Arthur, Competing technologies, increasing returns, and lock-in by historical events, Econ. J. 99 (1989) 116–131. [16] L. Argote, D. Epple, Learning curves in manufacturing, Science 247 (4945) (1990) 920–924. [17] B. Obama, The irreversible momentum of clean energy, Science 355 (2017) 126–129, <http://dx.doi.org/10.1126/science.aam6284>. [18] P.G. Bain, T.L. Milfont, Y. Kashima, M. Bilewicz, G. Doron, R.B. Garsdottir, V.V. Gouveia, Y. Guan, L.-O. Johansson, C. Pasquali, V. Corral-Verdugo, J.I. Aragones, A. Utsugi, C. Demarque, S. Otto, J. Park, M. Soland, L. Steg, R. Gonzalez, N. Lebedeva, O.J. Madsen, C. Wagner, C.S. Akotia, T. Kurz, J.L. Saiz, P.W. Schultz, G. Einarsdottir, N.M. Saviolidis, Co-benefits of addressing climate change can motivate action around the world, Nat. Clim. Change 6 (2) (2016) 154–157. [19] K. Siler-Evans, I.L. Azevedo, M.G. Morgan, J. Apt, Regional variations in the health, environmental, and climate benefits of wind and solar generation, Proc. Natl. Acad. Sci. 110 (29) (2013) 11768–11773, <http://dx.doi.org/10.1073/pnas.1221978110>. [20] J. Riesz, C. Sotiriadis, D. Ambach, S. Donovan, Quantifying the costs of a rapid transition to electric vehicles, Appl. Energy 180 (2016) 287–300, <http://dx.doi.org/10.1016/j.apenergy.2016.07.131>. [21] L. Clark, K. Jiang, K. Akimoto, M. Babiker, G. Blanford, K. Fischer-Vanden, J.-C. Hourcade, V. Krey, E. Kriegler, A. Löffelschel, D. McCollum, S. Paltsev, S. Rose, P.R. Shukla, M. Tavoni, B.C.C. van der Zwaan, D.P. van Vuuren, Assessing transformation pathways, Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK and New York, USA, 2014, pp. 413–510. [22] F. Geels, Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study, Res. Policy 31 (2002) 1257–1274. [23] A. Patt, Transforming Energy: Solving Climate Change with Technology Policy, Cambridge University Press, New York, 2015. [24] P. Portney, R. Stavins, Public Policies for Environmental Protection, Resources for the Future, Washington, 2000. [25] R. Naam, The Infinite Resource: The Power of Ideas on a Finite Planet, University Press of New England, Lebanon, NH, 2013. [26] E. Somanathan, T. Sterner, T. Sugiyama, D. Chimanikire, N.K. Dubash, J. Essandoh-Yeddu, S. Fifita, L. Goulder, A. Jaffe, X. Labandeira, S. Managi, C. Mitchell, J.P. Montero, F. Teng, T. Zylicz, National and sub-national policies and institutions, Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK

and New York, USA, 2014, pp. 1141-1205. [27] M. Grubb, Planetary Economics: Energy, Climate Change and the Three Domains of Sustainable Development, Earthscan, London, 2014. A. Patt Energy Research & Social Science 34 (2017) 133-143. [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0005](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0005) <http://dx.doi.org/10.1016/j.endeavour.2016.10.007> [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0015](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0015) <http://esa.un.org/unpp> [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0025](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0025) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0035](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0035) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0040](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0040) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0040](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0040) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0045](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0045) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0045](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0045) <http://dx.doi.org/10.1002/wcc.62> <http://dx.doi.org/10.1038/nature08017> [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0060](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0060) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0060](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0060) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0065](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0065) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0065](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0065) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0065](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0065) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0070](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0070](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0070](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0070](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0070](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0075](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0075) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0075](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0075) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0080](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0080) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0080](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0080) <http://dx.doi.org/10.1126/science.aam6284> [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0090](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0090](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0090](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0090](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0090](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0090](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090) <http://dx.doi.org/10.1073/pnas.1221978110> <http://dx.doi.org/10.1016/j.apenergy.2016.07.131> <http://dx.doi.org/10.1016/j.apenergy.2016.07.131> [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0105](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0105](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0105](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105)

3/sbref0105\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0110\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0110\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0115\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0115\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0120\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0120\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0125\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0125\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0135\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0135\n\n\n\tBeyond the tragedy of the commons: Reframing effective climate change governance\n\n\tThe tragedy of the commons\n\n\tWhy climate change fails the tragedy of the commons criteria\n\n\tFraming challenge in evolutionary terms\n\n\tAcknowledgment\n\n\tReferences\n\n\n\n\n\n", "title": "Week 1_Beyond the Tragedy of the Commons.pdf", "tether_id": null}, {"status": "finished_successfully", "end_turn": null, "weight": 1.0, "metadata": {"command": "context_stuff", "is_visually_hidden_from_conversation": true, "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "parent_id": "f74ad7b6-cd3a-4f6e-95d1-40879ae3fcde", "request_id": "87elc715391a83b5-MXP", "timestamp_": "absolute"}, {"recipient": "all", "channel": null}, {"parent": "f74ad7b6-cd3a-4f6e-95d1-40879ae3fcde", "children": [{"alacb42b-9157-46cd-b3ae-61a0377f5838"}], "alacb42b-9157-46cd-b3ae-61a0377f5838": {"id": "alacb42b-9157-46cd-b3ae-61a0377f5838", "message": {"id": "alacb42b-9157-46cd-b3ae-61a0377f5838", "author": {"role": "tool", "name": "myfiles_browser", "metadata": {}}, "create_time": 1714755356.227087, "update_time": null, "content": {"content_type": "tether_quote", "url": "file-mrPVQDMfIU0ex1GCG6VME4ga", "domain": "Week 1_Two Enduring Lessons from Elinor Ostrom.pdf", "text": "\nElectronic copy available at: http://ssrn.com/abstract=2252133Electronic copy available at: http://ssrn.com/abstract=2252133\n\n\n\n\n\n\n\n\n\nBenjamin N. Cardozo School of Law\n\u00b7 Yeshiva University\n\nJacob Burns Institute for Advanced Legal Studies\n\n\nMarch, 2013\n\nFaculty Research Paper No. 387\n\n\n\n\n\n\n\n\n\nTwo Enduring Lessons\n\nfrom Elinor Ostrom\n\n\n\n\nJournal of Institutional Economics (forthcoming 2013)\n\n\n\n\n\n\n\n\n\nBrett M. Frischmann\n\nProfessor of Law & Director, Cardozo Intellectual\n\nProperty and Information Law Program\n\nBenjamin N. Cardozo School of Law\n\n\n55 Fifth Avenue, Room 1004\n\nNew York, NY 10003\n\n\n(212) 790-0859 (phone)\n\n\nfrischma@yu.edu\n\n\n\n\n\n\n\n\n\nElectronic copy available at: https://ssrn.com/abstract=2252133\n\n\n\n\n\n\n\n\n\nElectronic copy available at: http://ssrn.com/abstract=2252133Electronic copy available at: http://ssrn.com/abstract=2252133\n\n\n\n\n\n\n\n\n\nJournal of Institutional Economics (forthcoming

2013) \n\n \n\n1 \n\n \n\nTwo Enduring Lessons from Elinor Ostrom \n\nBrett M. Frischmann\n1\n \n\nBenjamin N. Cardozo School of Law \n\nYeshiva University \n\nNew York, NY \n\nfrischma@yu.edu \n\n \n\nAbstract: \n\n \n\nThis article is a tribute to Elinor Ostrom. It explores two enduring lessons she taught: a \n\nsubstantive lesson that involves embracing complexity and context, and a methodological lesson \n\nthat involves embracing a framework-driven approach to systematic, evolutionary learning \n\nthrough various interdisciplinary methodologies, theories, and empirical approaches. \n\n \n\nFirst, I discuss Ostrom\u2019s work on environmental commons. I illustrate the two lessons through a \n\ndiscussion of the tragedy of the commons. Next, I explain how the two lessons play a significant \n\nrole in recent efforts to extend Ostrom\u2019s work on environmental commons to knowledge/cultural \n\ncommons. I draw a parallel between the tragedy of the commons allegory and the free rider \n\nallegory, and show how many of the problems Ostrom explored in the environmental context are \n\nmanifest in the cultural environmental context. I discuss an ongoing research project that follows \n\nthe path that Ostrom blazed and systematically studies commons in the cultural environment. \n\n \n\n*****

\n\n \n\nElinor Ostrom taught many lessons, as an amazing mentor, teacher, scholar, and human being. \n\nShe had a profound influence on me, and I am honored to offer this tribute to her. \n\nLike many others, I was inspired by Ostrom\u2019s design principles for natural resource commons \n\nand the demonstrated feasibility of community-based management for shared resources, and I \n\ntried to follow her lead. In fact, my first academic talk was about lessons from the literature on \n\nenvironmental commons that map to the study of other types of resource commons, such as \n\ninformation and Internet commons. I will return to the theme of that talk here. I will not discuss \n\nher theoretical or empirical contributions as such; many others have done so and will continue to \n\ndo so, and for good reason. Instead, I will discuss two enduring lessons Ostrom taught about \n\nsocial science research.\n2\n \n\nThe two lessons can be summarized as follows: \n\n

1 The author wishes to thank the editor-in-chief, two anonymous referees, Michael Burstein, Daniel Cole, Michael \n\nMadison, Al Roundtree, Charles Schweik, Alex Stein, and Katherine Strandburg for their constructive comments \n\nand suggestions. The usual disclaimer applies. 2 Throughout this article, I refer to contributions made by Ostrom and do not list all of her many collaborators \n\nor people who also made related contributions. But I want to be clear that she collaborated with many others \n\nand she readily acknowledged the independent contributions of many others working on similar issues. \n\nElectronic copy available at: <https://ssrn.com/abstract=2252133> \n\n \n\nJournal of Institutional Economics (forthcoming 2013) \n\n2 \n\n \n\nSubstantive Lesson: Embrace complexity and context\u2014or simply, reality; avoid \n\ndistorting reductionism and overstated gains from simple models. \n\nMethodological Lesson: Embrace systematic, evolutionary learning through various \n\ninterdisciplinary methodologies, theories, and empirical approaches, including case \n\nstudies; be aware of, and try to avoid, path dependencies from disciplinary or \n\nmethodological blinders. \n\nThe first lesson leads to the second. Anyone can say that one should embrace complexity and \n\nstudy reality, and many people do. What makes Elinor Ostrom incredibly special is that she \n\nworked tirelessly to develop a robust framework for doing it, and she did it, time and again, and \n\nin a collaborative way that built an international interdisciplinary community. \n\nIn Part I, I discuss Ostrom\u2019s work on environmental commons. I illustrate the two lessons in the \n\nenvironmental context

with a discussion of the tragedy of the commons. Ostrom's theoretical and empirical contributions probably are best recognized in the environmental context. Her contributions extend much further, as the Nobel Prize Committee recognized when it awarded her the 2009 prize along with Oliver Williamson. Still, there is plenty of work to be done in exploring and extending her contributions in other contexts. In Part II, I focus on that exploration and explain how the two lessons play a significant role in recent efforts to extend Ostrom's work on environmental commons to knowledge/cultural commons. I draw a parallel between the tragedy of the commons allegory and the free rider allegory, and then show how many of the problems Ostrom identified and explored in the environmental context are manifest in the cultural environmental context. I briefly discuss an ongoing research project that aims to follow the path that Ostrom blazed and systematically study commons in the cultural environment. I. Two Lessons from Ostrom's Work on Environmental Commons Elinor Ostrom's pioneering work challenged the notion that rational human beings would be helplessly trapped in social dilemmas. Much of her work focused on environmental commons and confronted the then-dominant and still powerful concept of the tragedy of the commons. The term "commons" generally conjures up the notion of a shared community resource, such as a public park or a common pasture. The term gained considerable notoriety among economists, political scientists, and other social scientists after the publication of Garrett Hardin's essay *The Tragedy of the Commons* in *Science* (1968). Hardin (1968: 1244) described the tragedy of the commons as follows: "Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013) "What is the utility to me of adding one more animal to my herd?" This utility has one negative and one positive component. 1) The positive component is a function of the increment of one animal. Since the herdsman receives all the proceeds from the sale of the additional animal, the positive utility is nearly +1. 2) The negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all the herdsmen, the negative utility for any particular decision-making herdsman is only a fraction of -1. Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another; and another.... But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all. 3) Hardin's formulation has been the subject of extensive analysis and critique. At its core, the tragedy of the commons allegory illustrates a standard externality problem each individual rationally maximizes his or her private welfare without accounting for external costs, i.e., the costs imposed on others. 4) Avoiding tragedy seems to require collective action to manage use of the shared resource. Simply put, unconstrained consumption is not sustainable, and thus, constraints must be introduced if the

resource is to be sustained. What should the constraints consist of? Hardin recognized two (top-down) solutions: government regulation and privatization. Government can constrain consumption by directly managing or regulating use of the shared resource. Alternatively, government can establish a system of private property rights delineating ownership of the resource. The former presumes that the government will take into account the aggregate effects and manage use of the resource efficiently over time, and the latter presumes that well-defined private property rights will facilitate market exchanges and lead to an efficient allocation of access and use rights, and consequently, efficient management of the resource over time (Demsetz, 1967). Both approaches eliminate the commons; no longer do commoners freely choose for themselves how to manage a shared resource, for such freedom, Hardin claims, brings ruin to all. Both approaches rely on collective action through government to introduce constraints. The approaches differ substantially in terms of the manner in which ongoing (month-to-month, day-to-day, minute-to-minute) resource allocation decisions are made.

I include the block quote because it is useful to see what Hardin actually said.

Paraphrasing Hardin often leads to adjustments that obscure or improve

Hardin's simple story. In Coasian terms, it is a joint cost problem (Coase, 1960). Electronic copy available at:

<https://ssrn.com/abstract=2252133> Journal of Institutional Economics

(forthcoming 2013) The tragedy of the commons allegory became the starting point for examining common pool resource problems and solutions. Many analysts assumed the tragedy of the commons model described a normal problem (at least for common pool resources) and a binary solution set followed: To avoid tragedy, society must turn to government command-and-control (micro-management) or private property-enabled markets. Economists, political scientists, and many others analyzed and debated how well these two types of regulatory solutions work. Will command-and-control regulation by government lead to efficient outcomes or would society be better off relying on private ordering by markets? Elinor Ostrom challenged the entire enterprise at its roots by asking two foundational sets of questions: First, how well does the tragedy of the commons allegory describe reality? Is it a useful theory for making predictions about real-world behavior of individuals sharing common pool resources? Does it describe a normal or exceptional situation? Does it provide a useful basis for choosing or designing regulatory solutions? Second, does the binary choice between government command-and-control regulation and private property-enabled markets reflect the full range of options? Are there alternative (bottom-up) institutions and/or means for collective action? Critically, the two sets of questions are related, particularly when one begins with the tragedy of the commons allegory. Hardin blurred resource system with resource management. In his allegory, the shared resource system is the pasture, and open access sharing among herders is the resource management or governance regime. As did many social scientists, Hardin made a series of assumptions with respect to both resource and resource management that limit the generalizability of his allegory. As Ostrom (2007: 15183) explained: Hardin envisioned a pasture open to all in which each herder received a direct benefit from adding animals to graze on the pasture and suffered only delayed costs from overgrazing. Translating his metaphor into a theory requires five assumptions: (i) the resource system is a pasture; (ii) no governance system is present related to the resource system; (iii) the mobile individual

resource units (the animals grazing on the pasture) can be identified and are the property of their owners and, when fattened, can be sold for cash; (iv) a sufficient number of users, given the size of the pasture, are using the pasture to adversely affect its long-term productivity; and (v) the resource users independently make decisions to maximize their own short-term returns. These five assumptions lead to a theoretical prediction of very high harvesting of the pasture grasses and severe overharvesting or destruction of the ecological system.

Electronic copy available at:
<https://ssrn.com/abstract=2252133>
 Journal of Institutional Economics
 (forthcoming 2013)

Situations characterized by these assumptions, in which individuals independently make anonymous decisions and primarily focus on their own immediate payoffs, do tend to overharvest open-access resources. Researchers have repeatedly generated a tragedy of the commons in experimental laboratories when subjects make independent and anonymous decisions in a common-pool resource setting. Making one small change in the structure of laboratory experiments, a change that is predicted by game theory to make no difference in the predicted outcome, has repeatedly had major impacts on interactions and outcomes. Simply enabling subjects to engage in face-to-face communication between decision rounds enables them to approach socially optimal harvesting levels rather than severely overharvesting the commons. In the face-to-face discussions, participants tend to discuss what they all should do and build norms to encourage conformance.⁵

Note that when the assumptions hold and fully describe the resource setting, the theory's predictions may be useful. But this is exceptional. Reality is considerably more complex. The tragedy of the commons allegory rarely describes shared resource settings in a sufficiently complete manner as to qualify as a useful theory for making predictions or prescribing regulatory solutions. More is needed. Of course, it may be convenient to work within the confines of the allegory or model and perhaps to assume that reality conforms to those confines because doing so makes analysis tractable and leads to a well-defined problem and possible solutions to compare and evaluate. But this is a fundamental mistake and an example of distorting reductionism. It can lead the analyst to miss what is most important and focus on what is least relevant. As Ostrom (2007) explained in the quote above, a slight change, which takes you outside the confines of the model, gives rise to solutions that completely escaped attention and would not be predicted to be relevant. Relaxing one of the assumptions, or just recognizing that some other factor is relevant to the situation, can change everything; cooperation to avoid tragedy becomes theoretically feasible without resort to one of the two solutions. As is now well understood in the field of institutional economics generally, community management, social norms, and other

Ostrom (2000) also critiqued reliance on the rational actor model when analyzing collective action and social dilemmas. After establishing a series of well-substantiated facts about human behavior based on extensive fieldwork: I believe that one is forced by these well-substantiated facts to adopt a more eclectic (and classical) view of human behavior (Ostrom, 2000: 141). She developed a second-generation model of rationality in which humans are complex, fallible learners who seek to do as well as they can given the constraints that they face and who are able to learn heuristics, norms, rules, and how to craft rules to improve achieved outcomes (Ostrom, 1998: 9). The

second-generation model of rationality predicts that reciprocity, reputation, and trust as \u201ccore relationships\u201d \u2013 can lead to increased net benefits (Ostrom, 1998: 13). This theoretical model identifies \u201cindividual attributes\u201d that \u2013 are particularly important in explaining behavior in social dilemmas: these attributes include \u201c[1] the expectations \u2013 individuals have about others\u2013; behavior (trust), [2] the norms individuals learn from socialization and life\u2013s \u2013 experiences (reciprocity), and [3] the identities individuals create that project their intentions and norms \u2013 (reputation)\u201d (Ostrom, 1998: 14). \u2013 Electronic copy available at: <https://ssrn.com/abstract=2252133> \u2013 \u2013 Journal of Institutional Economics (forthcoming 2013) \u2013 \u2013 \u2013 \u2013 \u2013 institutional arrangements are relevant solutions that can and often do outperform government \u2013 regulation and market regulation. \u2013 Ostrom\u2019s contribution goes well beyond recognizing the limits of models and acknowledging \u2013 what is theoretically feasible. While it is important to understand Ostrom\u2019s concerns about \u2013 model-induced myopia, it is equally if not more important to appreciate how she responded to \u2013 those concerns. In *Governing The Commons: The Evolution Of Institutions For Collective Action*, \u2013 for example, Ostrom (1990) explained how models such as the tragedy of the commons lead to \u2013 myopic analysis of solutions and policy prescriptions. She suggested that neither the Leviathan \u2013 (government regulation) nor Privatization (market regulation) is a panacea, and that model-induced \u2013 myopia leads analysts to ignore alternative institutional arrangements that may be more effective \u2013 tools for governance. But that is merely the beginning\u2014literally, chapter one of the book (Ostrom, \u2013 1990). \u2013 Ostrom was a scientist. Her response to concerns about model-induced myopia was to do the \u2013 scientific work of systematically studying actual resource systems and governance institutions. \u2013 Over decades, Ostrom demonstrated through a rich empirical program how self-organized \u2013 community governance often is an effective alternative for a wide range of shared resources. In \u2013 some contexts, communities can and do solve tragedy of the commons, collective action, and other \u2013 related resource management problems without (turning to) government regulation or market-\u2013 driven allocation as a panacea. They do so in a variety of ways, often relying on informal \u2013 mechanisms for coordinating behavior. Community solutions do not always succeed or always \u2013 fail; they sometimes succeed and sometimes fail. \u2013 The temptation to seek out regulatory panaceas \u2013 based on universal models, whether through private property, state action, or even notions of \u2013 community, must be resisted in favor of a more nuanced approach\u201d (Madison, Frischmann and \u2013 Strandburg, 2010a: 676). Context matters. \u2013 Recognizing that people sometimes cooperate effectively and build institutions to enable \u2013 sustainable shared use of common pool resources opened up the \u2013 solution space\u201d and focused \u2013 scholarly attention on complexity, context, communities, and institutions. This broader field of \u2013 vision not only brought informal institutions into view and encouraged their systematic study, \u2013 but it also improved our understanding of formal institutions by revealing the many different \u2013 ways that government, market, and community institutions depend on each other to be \u2013 successful.\u2013 \u2013 And it yielded two significant lessons, one substantive and one methodological. \u2013 Ostrom\u2019s Substantive Lesson: \u2013 \u2013 \u2013 As explored in a recent book, Ostrom\u2019s vision allows us to appreciate that government regulation of shared \u2013 environmental resources does not replace or eliminate the commons altogether\u2014for that would be the true tragedy! \u2013 Rather, in many cases, government regulation constructs a semi-commons where a narrow range of

resource \n\nusers/uses are constrained in order to sustain \u201cfreedom in the commons\u201d for a wide range of other resource \n\nusers/uses (Frischmann, 2012). \n\nElectronic copy available at: <https://ssrn.com/abstract=2252133>\n\n\n\nJournal of Institutional Economics (forthcoming 2013) \n\n \n\n7 \n\n \n\nEmbrace complexity and context\u2014or simply, reality. There is tremendous value in \n\nsystematically studying actual contexts that present potential tragedies and institutional \n\narrangements aimed at averting tragedies. \n\nBe wary of model-induced myopia, supposed panaceas, and binary thinking. The deep problem \n\nwith Hardin\u2019s tragedy of the commons allegory is not the allegory itself or its translation into a \n\nmodel or even a theory about how people might externalize costs in specific settings. The deep \n\nproblem is the myopia that the model induced and the binary government-or-market thinking \n\nthat followed. We consistently make the mistake of thinking in binary terms, individual or social, \n\nprivate or public, market or government. This leads to great distortions in our perceptions about \n\nthe world and the plans we make. Reality is much more complicated. \n\nStanding alone, this lesson may be underwhelming, or perhaps even offensive to the scholar. You \n\nmight be thinking, \u201cThis is not a lesson. We all know that studying reality beats studying fictitious \n\nscenarios that do not match reality.\u201d Naturally, the next question is how should one go about \n\nstudying reality? This leads to the second lesson. \n\n7 \n\n \n\nOstrom\u2019s Methodological Lesson: \n\nEmbrace systematic, evolutionary learning through various interdisciplinary methodologies, \n\ntheories, and empirical approaches, including case studies. There is tremendous value in a \n\nresearch framework that facilitates such learning while itself being subject to adaptation and \n\nrefinement over time. \n\nOstrom did not presume community based institutions were successful or ubiquitous. \n\nCommunity based institutions required systematic study. To facilitate research on these \n\ninstitutions across diverse resource systems, Ostrom worked for decades on developing a \n\nscientific approach to studying and evaluating institutions. She devoted incredible energy to \n\nmethodology, bridging disciplines, and enabling systematic, collaborative social science. \n\nTo systematize research, she developed the Institutional Analysis and Development (\u201cIAD\u201d) \n\nframework. \n\n8 \n\n It encourages interdisciplinary research and seeks to avoid path dependencies from \n\n7 The risk of model-induced myopia that Ostrom identified also provides a strong basis for taking a pluralistic \n\napproach to thinking about, and teaching, economics, especially if one cannot go out and study reality as Ostrom \n\ndid. \n\n8 I discuss the IAD framework as a prominent example, but the reader should understand that Ostrom extended her \n\nideas to the development of a more complex framework for the analysis of Social-Ecological Systems (Ostrom, \n\n2009). Moreover, even when applying the IAD framework, the specific context shaped the research protocols. For \n\nexample, as reported in Hayes and Ostrom (2005), Ostrom and colleagues associated with the Center for the Study \n\nof Institutions, Population, and Environmental Change (CIPEC) and the Workshop in Political Theory and Policy \n\nAnalysis, both at Indiana University, developed a complex question-based framework tailored for analyzing forests: \n\nOur research team spent two years developing a series of ten protocols, \u201d that \u201cenable scholars to examine the \n\nimpact of diverse ways of owning and governing forests (such as individual ownership, joint ownership by a \n\nElectronic copy available at: <https://ssrn.com/abstract=2252133>\n\n\n\nJournal of Institutional Economics (forthcoming 2013) \n\n \n\n8 \n\n \n\ndisciplinary or methodological blinders, problems akin to the model-induced myopia discussed \n\nabove.

The IAD framework structures a common set of research questions to apply across diverse contexts. Ostrom (2005: 28–29) explained the relationships between a research framework, theories, and models: The development and use of a general framework helps to identify the elements (and the relationships among these elements) that one needs to consider for institutional analysis. Frameworks . . . provide the most general set of variables that should be used to analyze all types of settings relevant for the framework. . . . The development and use of theories enable the analyst to specify which components of a framework are relevant for certain kinds of questions and to make broad working assumptions about these elements. Thus, theories focus on parts of a framework and make specific assumptions that are necessary for an analyst to diagnose a phenomenon, explain its processes, and predict outcomes. . . . Microeconomic theory, game theory, transaction cost theory, social choice theory, public choice, constitutional and covenantal theory, and theories of public goods and common-pool resources are all compatible with the IAD framework (Ostrom, 2006). The development and use of models make precise assumptions about a limited set of parameters and variables. Logic, mathematics, game theory models, experimentation and simulation, and other means are used to explore the consequences of these assumptions systematically on a limited set of outcomes. Multiple models are compatible with most theories. . . . The framework-driven approach is functionalist. It seeks to integrate theoretical and empirical research in coherent manner. Critically, Ostrom did not reject theories or models, but instead embraced the idea that different theories and models could work better for some observed phenomena than for others.

The IAD framework aims to systematize research efforts by facilitating a more rigorous evaluation by matching and testing of theories and models with observed phenomena, and most generally, enable learning over time (Madison, Frischmann and Strandburg, 2010a: 678). It depends heavily on empirical data, and consequently, on a systematic approach to gathering data. The IAD framework identifies the most general set of variables that should be used to analyze all types of settings relevant for the framework and divides the investigation of such variables into groups.

The first group is exogenous variables and includes biophysical characteristics, community attributes, and rules-in-use (or governance mechanisms). With respect to the community, and different forms of government ownership) on investment, harvesting, protection, and managing activities and their consequences on forest conditions, including biodiversity (Hayes and Ostrom, 2005: 603–604). She did reject the idea of a one-size-fits-all theory.

The following four paragraphs are adapted from Madison, Frischmann and Strandburg (2010a: 678–680). Electronic copy available at: <https://ssrn.com/abstract=2252133>

Journal of Institutional Economics (forthcoming 2013)

In analysis of a particular situation, these attributes of a commons are fixed. In the case of the lobster fishery, for example, these attributes might include the relevant biological characteristics of lobsters, such as the rates at which they age and reproduce; attributes of the community of fishermen, such as the proximity in which they live to others, the existence of familial relationships, and the skill sets needed for lobster fishing; and the rules explicit or informal that govern fishing.

The second group is the action arena, which refers to the social space where participants with diverse preferences interact, exchange goods and services, solve

problems, dominate one another, or fight (among the many things that individuals do in action arenas) (Ostrom, 2005: 14). In other words, the action arena is the context in which the exogenous variables combine in particular instances, leading over time to observed patterns of interactions and outcomes.

Ostrom's work emphasizes the diversity of possible combinations of exogenous variables that determine what actually happens in particular instances and, hence, the outcomes that result. The rules governing lobster fishing contribute to the activity's long-term sustainability, for example, but the patterns of interaction actually observed depend on the richness of the particular environment for lobsters, the degree to which rules are actually enforced, seasonal factors such as weather, and interaction with outside influences such as pollution and the state of the larger economy. Understanding the observed success or failure of a commons enterprise such as a lobster fishery may require accounting for all of these factors, even though it may turn out that outcomes are relatively impervious to some of them.

The foundation of the framework-driven analysis is structuring questions in clusters about the exogenous variables, the action arena, and the patterns of interactions and outcomes. This approach aims to systematize data gathering across complex, diverse phenomena while remaining amenable to diverse disciplinary perspectives and empirical methodologies. One interesting aspect of the IAD framework is its accommodation of and heavy reliance on case studies. Case studies are an important component to the research program because case studies provide rich, detailed descriptions of institutional arrangements in context. In addition, case studies provide feedback for the research framework itself.

Of course, case studies also slow

To implement the IAD framework, Ostrom and her collaborators employed a three-pronged approach: First, they engaged in a broad range of case studies of natural resource commons to form a basis for a bottom-up practice-based taxonomy of successful and unsuccessful approaches to resource management. Second, they developed a framework, based on the initial case studies, for identifying the variables that are significant in determining the success or failure of a commons enterprise and of the viability of institutions in particular contexts. Third, they preserved flexibility in their framework so that it could be adapted and revised in response to learning derived from the case studies. Based on the information obtained by applying their framework to structured case studies, they developed theories and models for particular commons situations, designed experiments to test those theories, and advanced a set of design principles for successful natural resource commons (Madison, Frischmann and Strandburg, 2010a: 676-677).

Electronic copy available at: <https://ssrn.com/abstract=2252133>

Journal of Institutional Economics (forthcoming 2013)

things down, making the empirical work more laborious, contentious, and incremental. Arguably, this is a virtue. Good (social) scientific research often takes time. A framework-driven approach is particularly attractive for studying the complex interactions between ecological and social (institutional) systems because of the many different disciplines and methodologies that must be brought to bear if progress is to be made (Ostrom, 2009).

Ostrom's embrace of complexity goes further than studying reality and adopting a framework to accommodate different theories and methodologies. She also embraced collaboration among different people, disciplines, and cultures. She worked hard to establish a common ground in the fractured academic world of the natural and social sciences (Becker and

Ostrom, 1995: \n\n114). Her work was forcefully interdisciplinary, and throughout her career, she called on various \n\ndisciplines to remove their disciplinary blinders. In her Presidential Address to the American \n\nPolitical Science Association, for example, Ostrom called for expansion of the \u201ctype of research \n\nmethods regularly used in political science\u201d and suggested that more understanding is required \n\nacross the social and biological sciences (Ostrom, 1998). \n\n\nOstrom recognized that studying commons requires a kind of commons of its own, an \n\ninterdisciplinary community for sharing skills, knowledge, research, and experience. So she \n\nbuilt one.\n12\n\nWith \u201can ad hoc group of scholars including political scientists, anthropologists, \n\neconomists, historians, and natural resource managers\u201d she founded the International Association \n\nfor the Study of the Commons.\n13\n\nShe was the first President of the IASC. The IASC\u2019s three \n\ngoals are \n\n1. to encourage exchange of knowledge among diverse disciplines, areas, and \n\nresource types; \n\n2. to foster mutual exchange of scholarship and practical experience; and \n\n3. to promote appropriate institutional design. \n\n\n\nIn pursuit of these goals, the IASC hosts major international conferences, publishes The \n\nCommons Digest and the International Journal of the Commons, and engages in many other \n\nactivities that promote knowledge sharing and build social capital and connections among those \n\nconcerned with commons.\n14\n\nOstrom\u2019s legacy is most vividly seen in the thousands of people \n\naround the world, in many different disciplines and professional settings, who consider \n\nthemselves a part of the research commons she helped construct. \n\n\n\n\n12 Actually, she built many. Of particular note, with her husband Vincent Ostrom, also a renowned political \n\nscientist, she founded the Workshop in Political Theory and Policy Analysis. The Workshop is an autonomous \n\nresearch center at Indiana University dedicated to the interdisciplinary, collaborative, and comparative study of \n\ninstitutions (see Indiana University Bloomington, 2008). In honor of the couple, IU renamed the workshop, The \n\nVincent and Elinor\nThe file is too long and its contents have been truncated.\n", "title": "Week 1_Two Enduring Lessons from Elinor Ostrom.pdf", "tether_id": null}, {"status": "finished_successfully", "end_turn": null, "weight": 1.0, "metadata": {"command": "context_stuff", "is_visually_hidden_from_conversation": true, "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "parent_id": "f5230846-4cc8-41cf-8748-4ald4a783c50", "request_id": "87e1c715391a83b5-MXP", "timestamp_": "absolute"}, {"recipient": "all", "channel": null}, {"parent": "f5230846-4cc8-41cf-8748-4ald4a783c50", "children": [{"id": "462c8935-33ef-4e97-9efd-e2dbd789c534"}]}, {"id": "462c8935-33ef-4e97-9efd-e2dbd789c534", "message": {"id": "462c8935-33ef-4e97-9efd-e2dbd789c534", "author": {"role": "tool", "name": "myfiles_browser", "metadata": {}}, "create_time": 1714755356.227243, "update_time": null, "content": {"content_type": "text", "parts": ["\nPlease remember to search the user's documents if an answer to their question is not contained in the above snippets.\n"]}, "status": "finished_successfully", "end_turn": null, "weight": 1.0, "metadata": {"is_visually_hidden_from_conversation": true, "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "pad": "AAA", "parent_id": "alacb42b-9157-46cd-b3ae-61a0377f5838", "request_id": "87e1c715391a83b5-MXP", "timestamp_": "absolute"}, {"recipient": "all", "channel": null}, {"parent": "alacb42b-9157-46cd-b3ae-61a0377f5838", "children": [{"id": "22d357b2-e184-4f63-be81-277b43e18652"}]}, {"id": "22d357b2-e184-4f63-be81-277b43e18652": {"id": "22d357b2-e184-4f63-be81-277b43e18652",

"message": {"id": "22d357b2-e184-4f63-be81-277b43e18652", "author": {"role": "assistant", "name": null, "metadata": {}}, "create_time": 1714755356.227401, "update_time": null, "content": {"content_type": "text", "parts": ["Azienda Agricola Vittorio Cassini, an olive oil production company in Italy, has made notable efforts in sustainability and transparency, though there is still room for improvement and adoption of additional sustainability measures. Let's reframe and expand the initial analysis in an academic context, incorporating insights and concepts from the provided materials.\n\n### Introduction\nSustainability in olive oil production is crucial not only for environmental conservation but also for maintaining the socioeconomic stability of rural communities. Azienda Agricola Vittorio Cassini, a producer of olive oil, serves as an illustrative case of how traditional agricultural practices are interfacing with modern sustainability demands.\n\n### Sustainability and Ethical Rating\nWhile Azienda has not explicitly pursued a Standard Ethics Rating, such voluntary ratings are aligned with broader EU and global sustainability goals. These ratings provide benchmarks that could guide the company towards international best practices in sustainability and transparency.\n\n### Current Sustainability Practices and Areas for Improvement\n#### Energy Efficiency\nAzienda could further reduce its carbon footprint by implementing renewable energy sources such as solar panels, which align with broader EU targets for renewable energy usage. As Brett M. Frischmann discusses, embracing complexity and avoiding reductionist solutions is crucial in resource management, which includes energy use in agricultural practices\u0010\u0020source\u0011.\n\n#### Water Management\nConsidering the significant water needs for olive cultivation, Azienda could improve its water management strategies. Techniques such as efficient irrigation systems, rainwater harvesting, and water recycling could be explored further. These techniques not only conserve water but also mirror the community-based management strategies that Elinor Ostrom found effective in managing commons sustainably\u0010\u0020source\u0011.\n\n#### Biodiversity Conservation\nPromoting biodiversity within olive groves could enhance ecosystem resilience and productivity. This approach is supported by Anthony Patt's argument against simplistic 'tragedy of the commons' frameworks, suggesting that complex, adaptive strategies are often necessary for effective resource management\u0010\u0020source\u0011.\n\n### Benefits vs. Burden\n#### Environmental and Social Benefits\nEnhancing sustainability practices would likely yield significant environmental benefits, such as reduced emissions and better soil health, and social benefits, including fair wages and improved local livelihoods.\n\n#### Costs and Complexity\nWhile the initial financial outlay for sustainability measures such as solar panels and water-efficient systems can be high, the long-term savings and benefits often offset these costs. The complexity of implementing these systems can be managed through phased approaches and potentially through subsidies or financial incentives from governmental or EU sources.\n\n### Enforcement and System Change\nCertification by third-party organizations (e.g., organic, Fair Trade) could enforce Azienda's sustainability claims and foster consumer trust. Regular supply chain audits would ensure compliance with sustainability standards. The complexity and costs of these initiatives are part of a broader investment in sustainability that could serve as a model for the industry.\n\n### Conclusion\nImplementing additional sustainability measures at Azienda Agricola Vittorio Cassini presents a compelling case for the benefits outweighing the burdens. The company's commitment to traditional methods combined with modern sustainability practices can serve as a

benefit both the olive oil industry, driving broader changes that benefit both the environment and the communities dependent on agriculture. This integration of new sustainability measures aligns with the broader movement towards more resilient and adaptive management of agricultural resources, as advocated by Ostrom and others\u0026#x201d; \"status\": \"finished_successfully\", \"end_turn\": true, \"weight\": 1.0, \"metadata\": {\"finish_details\": {\"type\": \"stop\", \"stop_tokens\": [100260]}, \"citations\": [{\"start_ix\": 1502, \"end_ix\": 1513, \"citation_format_type\": \"tether_og\", \"metadata\": {\"type\": \"file\", \"name\": \"Week 1_Two Enduring Lessons from Elinor Ostrom.pdf\", \"id\": \"file-mrPVQDMfIU0exlGC6VME4ga\", \"source\": \"my_files\", \"text\": \"\\nElectronic copy available at: http://ssrn.com/abstract=2252133Electronic copy available at: http://ssrn.com/abstract=2252133\\n\\n \\n \\n \\n \\n \\n \\nBenjamin N. Cardozo School of Law \\u00b7 Yeshiva University \\nJacob Burns Institute for Advanced Legal Studies \\n\\nMarch, 2013 \\nFaculty Research Paper No. 387 \\n\\n \\n \\n \\n \\n \\nTwo Enduring Lessons \\nfrom Elinor Ostrom \\n\\n \\nJournal of Institutional Economics (forthcoming 2013) \\n\\n \\n \\n \\n \\n \\n \\n \\nBrett M. Frischmann \\nProfessor of Law & Director, Cardozo Intellectual \\n\\nProperty and Information Law Program \\nBenjamin N. Cardozo School of Law \\n\\n55 Fifth Avenue, Room 1004 \\nNew York, NY 10003 \\n\\n(212) 790-0859 (phone) \\nfrischma@yu.edu \\n\\n \\n \\n \\nElectronic copy available at: https://ssrn.com/abstract=2252133\\n\\n \\nElectronic copy available at: http://ssrn.com/abstract=2252133Electronic copy available at: http://ssrn.com/abstract=2252133\\n\\nJournal of Institutional Economics (forthcoming 2013) \\n\\n \\n\\nl \\n\\n \\nTwo Enduring Lessons from Elinor Ostrom \\n\\nBrett M. Frischmann\\nl\\n \\n\\nBenjamin N. Cardozo School of Law \\n\\nYeshiva University \\n\\nNew York, NY \\n\\nfrischma@yu.edu \\n\\n \\n\\nAbstract: \\n\\n \\nThis article is a tribute to Elinor Ostrom. It explores two enduring lessons she taught: a \\n\\nsubstantive lesson that involves embracing complexity and context, and a methodological lesson \\n\\nthat involves embracing a framework-driven approach to systematic, evolutionary learning \\n\\nthrough various interdisciplinary methodologies, theories, and empirical approaches. \\n\\n \\nFirst, I discuss Ostrom\\u2019s work on environmental commons. I illustrate the two lessons through a \\n\\ndiscussion of the tragedy of the commons. Next, I explain how the two lessons play a significant \\n\\nrole in recent efforts to extend Ostrom\\u2019s work on environmental commons to knowledge/cultural \\n\\ncommons. I draw a parallel between the tragedy of the commons allegory and the free rider \\n\\nallegory, and show how many of the problems Ostrom explored in the environmental context are \\n\\nmanifest in the cultural environmental context. I discuss an ongoing research project that follows \\n\\nthe path that Ostrom blazed and systematically studies commons in the cultural environment. \\n\\n \\n*****\\n\\n \\nElinor Ostrom taught many lessons, as an amazing mentor, teacher, scholar, and human being. \\n\\nShe had a profound influence on me, and I am honored to offer this tribute to her. \\n\\nLike many others, I was inspired by Ostrom\\u2019s design principles for natural resource commons \\n\\nand the demonstrated feasibility of community-based management for shared resources, and I \\n\\ntried to follow her lead. In fact, my first academic talk was about lessons from the literature on \\n\\nenvironmental commons that map to the study of other types of resource commons, such as \\n\\ninformation and Internet commons. I will return to the theme of that talk here. I will not discuss \\n\\nher theoretical or empirical contributions as such; many others have done so and will continue to \\n\\ndo so, and for good reason. Instead, I will discuss two enduring lessons Ostrom taught about \\n\\nsocial science

research.

The two lessons can be summarized as follows:

The author wishes to thank the editor-in-chief, two anonymous referees, Michael Burstein, Daniel Cole, Michael Madison, Al Roundtree, Charles Schweik, Alex Stein, and Katherine Strandburg for their constructive comments and suggestions. The usual disclaimer applies.

Throughout this article, I refer to contributions made by Ostrom and do not list all of her many collaborators nor people who also made related contributions. But I want to be clear that she collaborated with many others and she readily acknowledged the independent contributions of many others working on similar issues.

Electronic copy available at:
<https://ssrn.com/abstract=2252133>

Journal of Institutional Economics
(forthcoming 2013)

Substantive Lesson: Embrace complexity and context or simply, reality; avoid distorting reductionism and overstated gains from simple models.

Methodological Lesson: Embrace systematic, evolutionary learning through various interdisciplinary methodologies, theories, and empirical approaches, including case studies; be aware of, and try to avoid, path dependencies from disciplinary or methodological blinders.

The first lesson leads to the second. Anyone can say that one should embrace complexity and study reality, and many people do. What makes Elinor Ostrom incredibly special is that she worked tirelessly to develop a robust framework for doing it, and she did it, time and again, and in a collaborative way that built an international interdisciplinary community.

In Part I, I discuss Ostrom's work on environmental commons. I illustrate the two lessons in the environmental context with a discussion of the tragedy of the commons. Ostrom's theoretical and empirical contributions probably are best recognized in the environmental context. Her contributions extend much further, as the Nobel Prize Committee recognized when it awarded her the 2009 prize along with Oliver Williamson. Still, there is plenty of work to be done in exploring and extending her contributions in other contexts.

In Part II, I focus on that exploration and explain how the two lessons play a significant role in recent efforts to extend Ostrom's work on environmental commons to knowledge/cultural commons. I draw a parallel between the tragedy of the commons allegory and the free rider allegory, and then show how many of the problems Ostrom identified and explored in the environmental context are manifest in the cultural environmental context. I briefly discuss an ongoing research project that aims to follow the path that Ostrom blazed and systematically study commons in the cultural environment.

I. Two Lessons from Ostrom's Work on Environmental Commons

Elinor Ostrom's pioneering work challenged the notion that rational human beings would be helplessly trapped in social dilemmas. Much of her work focused on environmental commons and confronted the then-dominant and still powerful concept of the tragedy of the commons.

The term commons would generally conjures up the notion of a shared community resource, such as a public park or a common pasture. The term gained considerable notoriety among economists, political scientists, and other social scientists after the publication of Garrett Hardin's essay The Tragedy of the Commons in Science (1968). Hardin (1968: 1244) described the tragedy of the commons as follows:

Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons.

As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he

Electronic copy available at:
<https://ssrn.com/abstract=2252133>

Journal of Institutional Economics

(forthcoming 2013) \n\n \n\n3 \n\n \n\nasks, "What is the utility to me of adding one more animal to my herd?" This utility \n\nhas one negative and one positive component. \n\n1) The positive component is a function of the increment of one animal. Since the \n\nherdsman receives all the proceeds from the sale of the additional animal, the \n\npositive utility is nearly +1. \n\n2) The negative component is a function of the additional overgrazing created by \n\none more animal. Since, however, the effects of overgrazing are shared by all the \n\nherdsmen, the negative utility for any particular decision-making herdsman is only \n\na fraction of -1. \n\nAdding together the component partial utilities, the rational herdsman concludes \n\nthat the only sensible course for him to pursue is to add another animal to his herd. \n\nAnd another; and another.... But this is the conclusion reached by each and every \n\nrational herdsman sharing a commons. Therein is the tragedy. Each man is locked \n\ninto a system that compels him to increase his herd without limit\u2014in a world that is \n\nlimited. Ruin is the destination toward which all men rush, each pursuing his own \n\nbest interest in a society that believes in the freedom of the commons. Freedom in a \n\ncommons brings ruin to all.\n3\n \n\nHardin\u2019s formulation has been the subject of extensive analysis and critique. At its core, the \n\ntragedy of the commons allegory illustrates a standard externality problem\u2014each individual \n\nrationally maximizes his or her private welfare without accounting for external costs, i.e., the costs \n\nimposed on others.\n4\n Avoiding tragedy seems to require collective action to manage use of the \n\nshared resource. Simply put, unconstrained consumption is not sustainable, and thus, constraints \n\nmust be introduced if the resource is to be sustained. \n\nWhat should the constraints consist of? Hardin recognized two (top-down) solutions: government \n\nregulation and privatization. Government can constrain consumption by directly managing or \n\nregulating use of the shared resource. Alternatively, government can establish a system of private \n\nproperty rights delineating ownership of the resource. The former presumes that the government \n\nwill take into account the aggregate effects and manage use of the resource efficiently over time, \n\nand the latter presumes that well-defined private property rights will facilitate market exchanges \n\nand lead to an efficient allocation of access and use rights, and consequently, efficient management \n\nof the resource over time (Demsetz, 1967). Both approaches eliminate the commons; no longer do \n\ncommoners freely choose for themselves how to manage a shared resource, for such freedom, \n\nHardin claims, \u201cbrings ruin to all.\u201d Both approaches rely on collective action through government \n\nto introduce constraints. The approaches differ substantially in terms of the manner in which \n\nongoing (month-to-month, day-to-day, minute-to-minute) resource allocation decisions are made. \n\nI include the block quote because it is useful to see what Hardin actually said. Paraphrasing Hardin often leads to \n\nadjustments that obscure or improve Hardin\u2019s simple story. \n4 In Coasian terms, it is a joint cost problem (Coase, 1960). \n\nElectronic copy available at:

<https://ssrn.com/abstract=2252133> \n\n \n\nJournal of Institutional Economics (forthcoming 2013) \n\n \n\n4 \n\n \n\nThe tragedy of the commons allegory became the starting point for examining common pool \n\nresource problems and solutions. Many analysts assumed the tragedy of the commons model \n\ndescribed a normal problem (at least for common pool resources) and a binary solution set \n\nfollowed: To avoid tragedy, society must turn to government command-and-control (micro-\n\nmanagement) or private property-enabled markets. Economists, political scientists, and many \n\nothers analyzed and debated how well these two types of regulatory solutions work.

Will command-and-control regulation by government lead to efficient outcomes or would society be better off relying on private ordering by markets? Elinor Ostrom challenged the entire enterprise at its roots by asking two foundational sets of questions: First, how well does the tragedy of the commons allegory describe reality? Is it a useful theory for making predictions about real-world behavior of individuals sharing common pool resources? Does it describe a normal or exceptional situation? Does it provide a useful basis for choosing or designing regulatory solutions? Second, does the binary choice between government command-and-control regulation and private property-enabled markets reflect the full range of options? Are there alternative (bottom-up) institutions and/or means for collective action? Critically, the two sets of questions are related, particularly when one begins with the tragedy of the commons allegory. Hardin blurred resource system with resource management. In his allegory, the shared resource system is the pasture, and open access sharing among herders is the resource management or governance regime. As did many social scientists, Hardin made a series of assumptions with respect to both resource and resource management that limit the generalizability of his allegory. As Ostrom (2007: 15183) explained: Hardin envisioned a pasture open to all in which each herder received a direct benefit from adding animals to graze on the pasture and suffered only delayed costs from overgrazing. Translating his metaphor into a theory requires five assumptions: (i) the resource system is a pasture; (ii) no governance system is present related to the resource system; (iii) the mobile individual resource units (the animals grazing on the pasture) can be identified and are the property of their owners and, when fattened, can be sold for cash; (iv) a sufficient number of users, given the size of the pasture, are using the pasture to adversely affect its long-term productivity; and (v) the resource users independently make decisions to maximize their own short-term returns. These five assumptions lead to a theoretical prediction of very high harvesting of the pasture grasses and severe overharvesting or destruction of the ecological system. Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013) Situations characterized by these assumptions, in which individuals independently make anonymous decisions and primarily focus on their own immediate payoffs, do tend to overharvest open-access resources. Researchers have repeatedly generated a tragedy of the commons in experimental laboratories when subjects make independent and anonymous decisions in a common-pool resource setting. Making one small change in the structure of laboratory experiments, a change that is predicted by game theory to make no difference in the predicted outcome, has repeatedly had major impacts on interactions and outcomes. Simply enabling subjects to engage in face-to-face communication between decision rounds enables them to approach socially optimal harvesting levels rather than severely overharvesting the commons. In the face-to-face discussions, participants tend to discuss what they all should do and build norms to encourage conformance.⁵ Note that when the assumptions hold and fully describe the resource setting, the theory's predictions may be useful. But this is exceptional. Reality is considerably more complex. The tragedy of the commons allegory rarely describes shared resource settings in a sufficiently complete manner as to qualify as a useful theory for making predictions or prescribing regulatory solutions. More is needed. Of course, it may be

convenient to work within the confines of the allegory or model and perhaps to assume that reality conforms to those confines because doing so makes analysis intractable and leads to a well-defined problem and possible solutions to compare and evaluate. But this is a fundamental mistake and an example of distorting reductionism. It can lead the analyst to miss what is most important and focus on what is least relevant. As Ostrom (2007) explained in the quote above, a slight change, which takes you outside the confines of the model, gives rise to solutions that completely escaped attention and would not be predicted to be relevant. Relaxing one of the assumptions, or just recognizing that some other factor is relevant to the situation, can change everything; cooperation to avoid tragedy becomes theoretically feasible without resort to one of the two solutions. As is now well understood in the field of institutional economics generally, community management, social norms, and other

Ostrom (2000) also critiqued reliance on the rational actor model when analyzing collective action and social dilemmas. After establishing a series of well-substantiated facts about human behavior based on extensive fieldwork: I believe that one is forced by these well-substantiated facts to adopt a more eclectic (and classical) view of human behavior (Ostrom, 2000: 141). She developed a second-generation model of rationality in which humans are complex, fallible learners who seek to do as well as they can given the constraints that they face and who are able to learn heuristics, norms, rules, and how to craft rules to improve achieved outcomes (Ostrom, 1998: 9). The second-generation model of rationality predicts that reciprocity, reputation, and trust as core relationships can lead to increased net benefits (Ostrom, 1998: 13). This theoretical model identifies individual attributes that are particularly important in explaining behavior in social dilemmas: these attributes include [1] the expectations individuals have about others' behavior (trust), [2] the norms individuals learn from socialization and life's experiences (reciprocity), and [3] the identities individuals create that project their intentions and norms (reputation) (Ostrom, 1998: 14). Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013) institutional arrangements are relevant solutions that can and often do outperform government regulation and market regulation. Ostrom's contribution goes well beyond recognizing the limits of models and acknowledging what is theoretically feasible. While it is important to understand Ostrom's concerns about model-induced myopia, it is equally if not more important to appreciate how she responded to those concerns. In *Governing The Commons: The Evolution Of Institutions For Collective Action*, for example, Ostrom (1990) explained how models such as the tragedy of the commons lead to myopic analysis of solutions and policy prescriptions. She suggested that neither the Leviathan (government regulation) nor Privatization (market regulation) is a panacea, and that model-induced myopia leads analysts to ignore alternative institutional arrangements that may be more effective tools for governance. But that is merely the beginning literally, chapter one of the book (Ostrom, 1990). Ostrom was a scientist. Her response to concerns about model-induced myopia was to do the scientific work of systematically studying actual resource systems and governance institutions. Over decades, Ostrom demonstrated through a rich empirical program how self-organized community governance often is an effective alternative for a wide range of shared resources. In some contexts,

communities can and do solve tragedy of the commons, collective action, and other unrelated resource management problems without (turning to) government regulation or market-driven allocation as a panacea. They do so in a variety of ways, often relying on informal mechanisms for coordinating behavior. Community solutions do not always succeed or always fail; they sometimes succeed and sometimes fail.

The temptation to seek out regulatory panaceas based on universal models, whether through private property, state action, or even notions of community, must be resisted in favor of a more nuanced approach (Madison, Frischmann and Strandburg, 2010a: 676). Context matters.

Recognizing that people sometimes cooperate effectively and build institutions to enable sustainable shared use of common pool resources opened up the solution space and focused scholarly attention on complexity, context, communities, and institutions. This broader field of vision not only brought informal institutions into view and encouraged their systematic study, but it also improved our understanding of formal institutions by revealing the many different ways that government, market, and community institutions depend on each other to be successful.

And it yielded two significant lessons, one substantive and one methodological.

Ostrom's Substantive Lesson:

As explored in a recent book, Ostrom's vision allows us to appreciate that government regulation of shared environmental resources does not replace or eliminate the commons altogether for that would be the true tragedy! Rather, in many cases, government regulation constructs a semi-commons where a narrow range of resource users/uses are constrained in order to sustain freedom in the commons for a wide range of other resource users/uses (Frischmann, 2012).

Electronic copy available at: <https://ssrn.com/abstract=2252133>

Journal of Institutional Economics (forthcoming 2013)

Embrace complexity and context for simply, reality. There is tremendous value in systematically studying actual contexts that present potential tragedies and institutional arrangements aimed at averting tragedies.

Be wary of model-induced myopia, supposed panaceas, and binary thinking. The deep problem with Hardin's tragedy of the commons allegory is not the allegory itself or its translation into a model or even a theory about how people might externalize costs in specific settings. The deep problem is the myopia that the model induced and the binary government-or-market thinking that followed. We consistently make the mistake of thinking in binary terms, individual or social, private or public, market or government. This leads to great distortions in our perceptions about the world and the plans we make. Reality is much more complicated.

Standing alone, this lesson may be underwhelming, or perhaps even offensive to the scholar. You might be thinking, This is not a lesson. We all know that studying reality beats studying fictitious scenarios that do not match reality.

Naturally, the next question is how should one go about studying reality? This leads to the second lesson.

Ostrom's Methodological Lesson:

Embrace systematic, evolutionary learning through various interdisciplinary methodologies, theories, and empirical approaches, including case studies. There is tremendous value in a research framework that facilitates such learning while itself being subject to adaptation and refinement over time.

Ostrom did not presume community based institutions were successful or ubiquitous. Community based institutions required systematic study. To facilitate research on these institutions across diverse resource systems, Ostrom worked for decades on developing a scientific approach to

studying and evaluating institutions. She devoted incredible energy to methodology, bridging disciplines, and enabling systematic, collaborative social science. To systematize research, she developed the Institutional Analysis and Development (IAD) framework. It encourages interdisciplinary research and seeks to avoid path dependencies from

The risk of model-induced myopia that Ostrom identified also provides a strong basis for taking a pluralistic approach to thinking about, and teaching, economics, especially if one cannot go out and study reality as Ostrom did. I discuss the IAD framework as a prominent example, but the reader should understand that Ostrom extended her ideas to the development of a more complex framework for the analysis of Social-Ecological Systems (Ostrom, 2009). Moreover, even when applying the IAD framework, the specific context shaped the research protocols. For example, as reported in Hayes and Ostrom (2005), Ostrom and colleagues associated with the Center for the Study of Institutions, Population, and Environmental Change (CIPEC) and the Workshop in Political Theory and Policy Analysis, both at Indiana University, developed a complex question-based framework tailored for analyzing forests:

Our research team spent two years developing a series of ten protocols that enable scholars to examine the impact of diverse ways of owning and governing forests (such as individual ownership, joint ownership by a

Electronic copy available at: <https://ssrn.com/abstract=2252133>

Journal of Institutional Economics (forthcoming 2013)

Interdisciplinary or methodological blinders, problems akin to the model-induced myopia discussed above. The IAD framework structures a common set of research questions to apply across diverse contexts. Ostrom (2005: 28-29) explained the relationships between a research framework, theories, and models: The development and use of a general framework helps to identify the elements (and the relationships among these elements) that one needs to consider for institutional analysis. Frameworks . . . provide the most general set of variables that should be used to analyze all types of settings relevant for the framework. . . . The development and use of theories enable the analyst to specify which components of a framework are relevant for certain kinds of questions and to make broad working assumptions about these elements. Thus, theories focus on parts of a framework and make specific assumptions that are necessary for an analyst to diagnose a phenomenon, explain its processes, and predict outcomes. . . . Microeconomic theory, game theory, transaction cost theory, social choice theory, public choice, constitutional and covenantal theory, and theories of public goods and common-pool resources are all compatible with the IAD framework (2006). The development and use of models make precise assumptions about a limited set of parameters and variables. Logic, mathematics, game theory models, experimentation and simulation, and other means are used to explore the consequences of these assumptions systematically on a limited set of outcomes. Multiple models are compatible with most theories. . . . The framework-driven approach is functionalist. It seeks to integrate theoretical and empirical research in coherent manner. Critically, Ostrom did not reject theories or models, but instead embraced the idea that different theories and models could work better for some observed phenomena than for others.

The IAD framework aims to systematize research efforts by facilitating a more rigorous evaluation by matching and testing of theories and models with observed phenomena, and most generally, enable learning over time (Madison, Frischmann and Strandburg, 2010a: 678). It

depends heavily on empirical data, and consequently, on a systematic approach to gathering data. The IAD framework identifies the most general set of variables that should be used to analyze all types of settings relevant for the framework and divides the investigation of such variables into groups. The first group is exogenous variables and includes biophysical characteristics, community attributes, and rules-in-use (or governance mechanisms). With respect to the

community, and different forms of government ownership) on investment, harvesting, protection, and managing activities and their consequences on forest conditions, including biodiversity (Hayes and Ostrom, 2005: 603-604). She did reject the idea of a one-size-fits-all theory. The following four paragraphs are adapted from Madison, Frischmann and Strandburg (2010a: 678-680). Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013) analysis of a particular situation, these attributes of a commons are fixed. In the case of the lobster fishery, for example, these attributes might include the relevant biological characteristics of lobsters, such as the rates at which they age and reproduce; attributes of the community of fishermen, such as the proximity in which they live to others, the existence of familial relationships, and the skill sets needed for lobster fishing; and the rules explicit or informal that govern fishing. The second group is the action arena, which refers to the social space where participants with diverse preferences interact, exchange goods and services, solve problems, dominate one another, or fight (among the many things that individuals do in action arenas) (Ostrom, 2005: 14). In other words, the action arena is the context in which the exogenous variables combine in particular instances, leading over time to observed patterns of interactions and outcomes.

Ostrom's work emphasizes the diversity of possible combinations of exogenous variables that determine what actually happens in particular instances and, hence, the outcomes that result. The rules governing lobster fishing contribute to the activity's long-term sustainability, for example, but the patterns of interaction actually observed depend on the richness of the particular environment for lobsters, the degree to which rules are actually enforced, seasonal factors such as weather, and interaction with outside influences such as pollution and the state of the larger economy. Understanding the observed success or failure of a commons enterprise such as a lobster fishery may require accounting for all of these factors, even though it may turn out that outcomes are relatively impervious to some of them. The foundation of the framework-driven analysis is structuring questions in clusters about the exogenous variables, the action arena, and the patterns of interactions and outcomes. This approach aims to systematize data gathering across complex, diverse phenomena while remaining amenable to diverse disciplinary perspectives and empirical methodologies. One interesting aspect of the IAD framework is its accommodation of and heavy reliance on case studies.

Case studies are an important component to the research program because case studies provide rich, detailed descriptions of institutional arrangements in context. In addition, case studies provide feedback for the research framework itself. Of course, case studies also slow

To implement the IAD framework, Ostrom and her collaborators employed a three-pronged approach: First, they engaged in a broad range of case studies of natural resource commons to form a basis for a bottom-up practice-based taxonomy of

successful and unsuccessful approaches to resource management. Second, they developed a framework, based on the initial case studies, for identifying the variables that are significant in determining the success or failure of a commons enterprise and of the viability of institutions in particular contexts. Third, they preserved flexibility in their framework so that it could be adapted and revised in response to learning derived from the case studies. Based on the information obtained by applying their framework to structured case studies, they developed theories and models for particular commons situations, designed experiments to test those theories, and advanced a set of design principles for successful natural resource commons (Madison, Frischmann and Strandburg, 2010a: 676–677). Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013) things down, making the empirical work more laborious, contentious, and incremental. Arguably, this is a virtue. Good (social) scientific research often takes time. A framework driven approach is particularly attractive for studying the complex interactions between ecological and social (institutional) systems because of the many different disciplines and methodologies that must be brought to bear if progress is to be made (Ostrom, 2009). Ostrom's embrace of complexity goes further than studying reality and adopting a framework to accommodate different theories and methodologies. She also embraced collaboration among different people, disciplines, and cultures. She worked hard to establish a common ground in the fractured academic world of the natural and social sciences (Becker and Ostrom, 1995: 114). Her work was forcefully interdisciplinary, and throughout her career, she called on various disciplines to remove their disciplinary blinders. In her Presidential Address to the American Political Science Association, for example, Ostrom called for expansion of the type of research methods regularly used in political science and suggested that more understanding is required across the social and biological sciences (Ostrom, 1998). Ostrom recognized that studying commons requires a kind of commons of its own, an interdisciplinary community for sharing skills, knowledge, research, and experience. So she built one. With an ad hoc group of scholars including political scientists, anthropologists, economists, historians, and natural resource managers she founded the International Association for the Study of the Commons. She was the first President of the IASC. The IASC's three goals are 1. to encourage exchange of knowledge among diverse disciplines, areas, and resource types; 2. to foster mutual exchange of scholarship and practical experience; and 3. to promote appropriate institutional design. In pursuit of these goals, the IASC hosts major international conferences, publishes The Commons Digest and the International Journal of the Commons, and engages in many other activities that promote knowledge sharing and build social capital and connections among those concerned with commons. Ostrom's legacy is most vividly seen in the thousands of people around the world, in many different disciplines and professional settings, who consider themselves a part of the research commons she helped construct. Actually, she built many. Of particular note, with her husband Vincent Ostrom, also a renowned political scientist, she founded the Workshop in Political Theory and Policy Analysis. The Workshop is an autonomous research center at Indiana University dedicated to the interdisciplinary, collaborative, and comparative study of

\n\ninstitutions (see Indiana University Bloomington, 2008). In honor of the couple, IU renamed the workshop, The \n\nVincent and Elinor\nThe file is too long and its contents have been truncated.\n", "extra": {"cited_message_idx": 10, "search_result_idx": null, "evidence_text": "source"}, "url": "file-mrPVQDMfIUUnOexlGC6VME4ga"}}, {"start_ix": 1939, "end_ix": 1950, "citation_format_type": "tether_og", "metadata": {"type": "file", "name": "Week 1_Two Enduring Lessons from Elinor Ostrom.pdf", "id": "file-mrPVQDMfIUUnOexlGC6VME4ga", "source": "my_files", "text": "\nElectronic copy available at: http://ssrn.com/abstract=2252133Electronic copy available at: http://ssrn.com/abstract=2252133\n\n\n\n\n\n\n\nBenjamin N. Cardozo School of Law \nu00b7 Yeshiva University \nJacob Burns Institute for Advanced Legal Studies \n\nMarch, 2013 \nFaculty Research Paper No. 387 \n\n\n\n\n\n\n\nTwo Enduring Lessons \nfrom Elinor Ostrom \n\nJournal of Institutional Economics (forthcoming 2013) \n\n\n\n\n\nBrett M. Frischmann \nProfessor of Law & Director, Cardozo Intellectual \nProperty and Information Law Program \nBenjamin N. Cardozo School of Law \n55 Fifth Avenue, Room 1004 \nNew York, NY 10003 \n(212) 790-0859 (phone) \nfrischma@yu.edu \n\n\n\n\nElectronic copy available at: https://ssrn.com/abstract=2252133\n\n\n\n\nElectronic copy available at: http://ssrn.com/abstract=2252133Electronic copy available at: http://ssrn.com/abstract=2252133\n\nJournal of Institutional Economics (forthcoming 2013) \n\n\n\n\n\n\n\nTwo Enduring Lessons from Elinor Ostrom \n\nBrett M. Frischmann\n\n\n\nBenjamin N. Cardozo School of Law \nYeshiva University \nNew York, NY \nfrischma@yu.edu \n\n\n\nAbstract: \n\nThis article is a tribute to Elinor Ostrom. It explores two enduring lessons she taught: a \nsubstantive lesson that involves embracing complexity and context, and a methodological lesson \nthat involves embracing a framework-driven approach to systematic, evolutionary learning \nthrough various interdisciplinary methodologies, theories, and empirical approaches. \n\nFirst, I discuss Ostrom\u2019s work on environmental commons. I illustrate the two lessons through a \ndiscussion of the tragedy of the commons. Next, I explain how the two lessons play a significant \nrole in recent efforts to extend Ostrom\u2019s work on environmental commons to knowledge/cultural \ncommons. I draw a parallel between the tragedy of the commons allegory and the free rider \nallegory, and show how many of the problems Ostrom explored in the environmental context are \nmanifest in the cultural environmental context. I discuss an ongoing research project that follows \nthe path that Ostrom blazed and systematically studies commons in the cultural environment. \n\n*****\n\nElinor Ostrom taught many lessons, as an amazing mentor, teacher, scholar, and human being. \nShe had a profound influence on me, and I am honored to offer this tribute to her. \nLike many others, I was inspired by Ostrom\u2019s design principles for natural resource commons \nand the demonstrated feasibility of community-based management for shared resources, and I \ntried to follow her lead. In fact, my first academic talk was about lessons from the literature on \nenvironmental commons that map to the study of other types of resource commons, such as \ninformation and Internet commons. I will return to the theme of that talk here. I will not discuss \nher theoretical or empirical contributions as such; many others have done so and will continue to \ndo so, and for good reason. Instead, I will discuss two enduring lessons Ostrom taught about \nsocial science research.\n2\n\nThe twolessons can be summarized as follows: \n\nThe author wishes to thank the editor-in-chief, two anonymous referees, Michael Burstein, Daniel Cole, Michael \nMadison, Al Roundtree, Charles Schweik, Alex Stein,

and Katherine Strandburg for their constructive comments and suggestions. The usual disclaimer applies. Throughout this article, I refer to contributions made by Ostrom and do not list all of her many collaborators nor people who also made related contributions. But I want to be clear that she collaborated with many others and she readily acknowledged the independent contributions of many others working on similar issues. Electronic copy available at:

<https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013)

Throughout this article, I refer to contributions made by Ostrom and do not list all of her many collaborators nor people who also made related contributions. But I want to be clear that she collaborated with many others and she readily acknowledged the independent contributions of many others working on similar issues. Electronic copy available at:

<https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013)

Substantive Lesson: Embrace complexity and context or simply, reality; avoid distorting reductionism and overstated gains from simple models.

Methodological Lesson: Embrace systematic, evolutionary learning through various interdisciplinary methodologies, theories, and empirical approaches, including case studies; be aware of, and try to avoid, path dependencies from disciplinary or methodological blinders.

The first lesson leads to the second. Anyone can say that one should embrace complexity and study reality, and many people do. What makes Elinor Ostrom incredibly special is that she worked tirelessly to develop a robust framework for doing it, and she did it, time and again, and in a collaborative way that built an international interdisciplinary community.

In Part I, I discuss Ostrom's work on environmental commons. I illustrate the two lessons in the environmental context with a discussion of the tragedy of the commons. Ostrom's theoretical and empirical contributions probably are best recognized in the environmental context. Her contributions extend much further, as the Nobel Prize Committee recognized when it awarded her the 2009 prize along with Oliver Williamson. Still, there is plenty of work to be done in exploring and extending her contributions in other contexts. In Part II, I focus on that exploration and explain how the two lessons play a significant role in recent efforts to extend Ostrom's work on environmental commons to knowledge/cultural commons. I draw a parallel between the tragedy of the commons allegory and the free rider allegory, and then show how many of the problems Ostrom identified and explored in the environmental context are manifest in the cultural environmental context. I briefly discuss an ongoing research project that aims to follow the path that Ostrom blazed and systematically study commons in the cultural environment.

I. Two Lessons from Ostrom's Work on Environmental Commons

Elinor Ostrom's pioneering work challenged the notion that rational human beings would be helplessly trapped in social dilemmas. Much of her work focused on environmental commons and confronted the then-dominant and still powerful concept of the tragedy of the commons. The term commons would generally conjure up the notion of a shared community resource, such as a public park or a common pasture. The term gained considerable notoriety among economists, political scientists, and other social scientists after the publication of Garrett Hardin's essay The Tragedy of the Commons in Science (1968). Hardin (1968: 1244) described the tragedy of the commons as follows: Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he

Electronic copy available at:

<https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013)

asks, "What is the utility to me of adding one more animal to my herd?" This utility has one negative and one positive component. The positive component is a function of the increment of one animal.

Since the herdsman receives all the proceeds from the sale of the additional animal, the positive utility is nearly +1. The negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all the herdsmen, the negative utility for any particular decision-making herdsman is only a fraction of -1. Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another; and another.... But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all.

Hardin's formulation has been the subject of extensive analysis and critique. At its core, the tragedy of the commons allegory illustrates a standard externality problem: each individual rationally maximizes his or her private welfare without accounting for external costs, i.e., the costs imposed on others. Avoiding tragedy seems to require collective action to manage use of the shared resource. Simply put, unconstrained consumption is not sustainable, and thus, constraints must be introduced if the resource is to be sustained. What should the constraints consist of? Hardin recognized two (top-down) solutions: government regulation and privatization. Government can constrain consumption by directly managing or regulating use of the shared resource. Alternatively, government can establish a system of private property rights delineating ownership of the resource. The former presumes that the government will take into account the aggregate effects and manage use of the resource efficiently over time, and the latter presumes that well-defined private property rights will facilitate market exchanges and lead to an efficient allocation of access and use rights, and consequently, efficient management of the resource over time (Demsetz, 1967). Both approaches eliminate the commons; no longer do commoners freely choose for themselves how to manage a shared resource, for such freedom, Hardin claims, brings ruin to all. Both approaches rely on collective action through government to introduce constraints. The approaches differ substantially in terms of the manner in which ongoing (month-to-month, day-to-day, minute-to-minute) resource allocation decisions are made.

I include the block quote because it is useful to see what Hardin actually said. Paraphrasing Hardin often leads to adjustments that obscure or improve Hardin's simple story. In Coasian terms, it is a joint cost problem (Coase, 1960). Electronic copy available at: <https://ssrn.com/abstract=2252133>

Journal of Institutional Economics (forthcoming 2013)

The tragedy of the commons allegory became the starting point for examining common pool resource problems and solutions. Many analysts assumed the tragedy of the commons model described a normal problem (at least for common pool resources) and a binary solution set followed: To avoid tragedy, society must turn to government command-and-control (micro-management) or private property-enabled markets. Economists, political scientists, and many others analyzed and debated how well these two types of regulatory solutions work. Will command-and-control regulation by government lead to efficient outcomes or would society be better off relying on private ordering by markets? Elinor Ostrom challenged the entire enterprise at its roots by asking two foundational sets

of \n\nquestions: First, how well does the tragedy of the commons allegory describe reality? Is it a \n\nuseful theory for making predictions about real-world behavior of individuals sharing common \n\npool resources? Does it describe a normal or exceptional situation? Does it provide a useful basis \n\nfor choosing or designing regulatory solutions? Second, does the binary choice between \n\n government command-and-control regulation and private property-enabled markets reflect the full \n\nrange of options? Are there alternative (bottom-up) institutions and/or means for collective \n\naction? \n\nCritically, the two sets of questions are related, particularly when one begins with the tragedy of \n\nthe commons allegory. Hardin blurred resource system with resource management. In his \n\nallegory, the shared resource system is the pasture, and open access sharing among herders is the \n\nresource management or governance regime. As did many social scientists, Hardin made a series \n\nof assumptions with respect to both resource and resource management that limit the \n\n generalizability of his allegory. As Ostrom (2007: 15183) explained: \n\nHardin envisioned a pasture open to all in which each herder received a direct \n\nbenefit from adding animals to graze on the pasture and suffered only delayed costs \n\nfrom overgrazing. Translating his metaphor into a theory requires five assumptions: \n\n(i) the resource system is a pasture; \n\n(ii) no governance system is present related to the resource system; \n\n(iii) the mobile individual resource units (the animals grazing on the \n\npasture) can be identified and are the property of their owners and, when \n\nfattened, can be sold for cash; \n\n(iv) a sufficient number of users, given the size of the pasture, are using the \n\npasture to adversely affect its long-term productivity; and \n\n(v) the resource users independently make decisions to maximize their own \n\nshort-term returns. \n\nThese five assumptions \u2026 lead to a theoretical prediction of very high harvesting of \n\nthe pasture grasses and severe overharvesting or destruction of the ecological \n\nsystem. \n\n \n\n* * * \n\nElectronic copy available at: <https://ssrn.com/abstract=2252133> \n\n \n\nJournal of Institutional Economics (forthcoming 2013) \n\n \n\n5 \n\n \n\nSituations characterized by these assumptions, in which individuals independently \n\nmake anonymous decisions and primarily focus on their own immediate payoffs, do \n\ntend to overharvest open-access resources. Researchers have repeatedly generated a \n\ntragedy of the commons \u201d in experimental laboratories when subjects make \n\nindependent and anonymous decisions in a common-pool resource setting. \n\n \n\nMaking one small change \u2026 in the structure of laboratory experiments, a change \n\nthat is predicted by game theory to make no difference in the predicted outcome, \n\nhas repeatedly had major impacts on interactions and outcomes. Simply enabling \n\nsubjects to engage in face-to-face communication between decision rounds enables \n\nthem to approach socially optimal harvesting levels rather than severely \n\noverharvesting the commons. In the face-to-face discussions, participants tend to \n\ndiscuss what they all should do and build norms to encourage conformance.⁵ \n\n \n\nNote that when the assumptions hold and fully describe the resource setting, the theory \n\npredictions may be useful. But this is exceptional. Reality is considerably more complex. The \n\ntragedy of the commons allegory rarely describes shared resource settings in a sufficiently \n\ncomplete manner as to qualify as a useful theory for making predictions or prescribing regulatory \n\nsolutions. More is needed. \n\nOf course, it may be convenient to work within the confines of the allegory or model \n\nand \n\nperhaps to assume that reality conforms to those confines \n\nbecause doing so makes analysis \n\ntractable and leads to a well-defined problem and possible solutions to compare

and evaluate. But this is a fundamental mistake and an example of distorting reductionism. It can lead the analyst to miss what is most important and focus on what is least relevant. As Ostrom (2007) explained in the quote above, a slight change, which takes you outside the confines of the model, gives rise to solutions that completely escaped attention and would not be predicted to be relevant. Relaxing one of the assumptions, or just recognizing that some other factor is relevant to the situation, can change everything; cooperation to avoid tragedy becomes theoretically feasible without resort to one of the two solutions. As is now well understood in the field of institutional economics generally, community management, social norms, and other

Ostrom (2000) also critiqued reliance on the rational actor model when analyzing collective action and social dilemmas. After establishing a series of well-substantiated facts about human behavior based on extensive fieldwork: I believe that one is forced by these well-substantiated facts to adopt a more eclectic (and classical) view of human behavior (Ostrom, 2000: 141). She developed a second-generation model of rationality in which humans are complex, fallible learners who seek to do as well as they can given the constraints that they face and who are able to learn heuristics, norms, rules, and how to craft rules to improve achieved outcomes (Ostrom, 1998: 9). The second-generation model of rationality predicts that reciprocity, reputation, and trust as core relationships can lead to increased net benefits (Ostrom, 1998: 13). This theoretical model identifies individual attributes that are particularly important in explaining behavior in social dilemmas: these attributes include [1] the expectations individuals have about others' behavior (trust), [2] the norms individuals learn from socialization and life's experiences (reciprocity), and [3] the identities individuals create that project their intentions and norms (reputation) (Ostrom, 1998: 14). Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013)

6 Institutional arrangements are relevant solutions that can and often do outperform government regulation and market regulation. Ostrom's contribution goes well beyond recognizing the limits of models and acknowledging what is theoretically feasible. While it is important to understand Ostrom's concerns about model-induced myopia, it is equally if not more important to appreciate how she responded to those concerns. In *Governing The Commons: The Evolution Of Institutions For Collective Action*, for example, Ostrom (1990) explained how models such as the tragedy of the commons lead to myopic analysis of solutions and policy prescriptions. She suggested that neither the Leviathan (government regulation) nor Privatization (market regulation) is a panacea, and that model-induced myopia leads analysts to ignore alternative institutional arrangements that may be more effective tools for governance. But that is merely the beginning literally, chapter one of the book (Ostrom, 1990). Ostrom was a scientist. Her response to concerns about model-induced myopia was to do the scientific work of systematically studying actual resource systems and governance institutions. Over decades, Ostrom demonstrated through a rich empirical program how self-organized community governance often is an effective alternative for a wide range of shared resources. In some contexts, communities can and do solve tragedy of the commons, collective action, and other related resource management problems without (turning to) government regulation or market-driven allocation as a panacea. They do so in a variety of ways, often

relying on informal mechanisms for coordinating behavior. Community solutions do not always succeed or always fail; they sometimes succeed and sometimes fail. The temptation to seek out regulatory panaceas based on universal models, whether through private property, state action, or even notions of community, must be resisted in favor of a more nuanced approach (Madison, Frischmann and Strandburg, 2010a: 676). Context matters. Recognizing that people sometimes cooperate effectively and build institutions to enable sustainable shared use of common pool resources opened up the solution space and focused scholarly attention on complexity, context, communities, and institutions. This broader field of vision not only brought informal institutions into view and encouraged their systematic study, but it also improved our understanding of formal institutions by revealing the many different ways that government, market, and community institutions depend on each other to be successful. And it yielded two significant lessons, one substantive and one methodological.

Ostrom's Substantive Lesson:

As explored in a recent book, Ostrom's vision allows us to appreciate that government regulation of shared environmental resources does not replace or eliminate the commons altogether for that would be the true tragedy! Rather, in many cases, government regulation constructs a semi-commons where a narrow range of resource users/uses are constrained in order to sustain freedom in the commons for a wide range of other resource users/uses (Frischmann, 2012). Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013) Embrace complexity and context or simply, reality. There is tremendous value in systematically studying actual contexts that present potential tragedies and institutional arrangements aimed at averting tragedies. Be wary of model-induced myopia, supposed panaceas, and binary thinking. The deep problem with Hardin's tragedy of the commons allegory is not the allegory itself or its translation into a model or even a theory about how people might externalize costs in specific settings. The deep problem is the myopia that the model induced and the binary government-or-market thinking that followed. We consistently make the mistake of thinking in binary terms, individual or social, private or public, market or government. This leads to great distortions in our perceptions about the world and the plans we make. Reality is much more complicated. Standing alone, this lesson may be underwhelming, or perhaps even offensive to the scholar. You might be thinking, This is not a lesson. We all know that studying reality beats studying fictitious scenarios that do not match reality. Naturally, the next question is how should one go about studying reality? This leads to the second lesson. Ostrom's Methodological Lesson: Embrace systematic, evolutionary learning through various interdisciplinary methodologies, theories, and empirical approaches, including case studies. There is tremendous value in a research framework that facilitates such learning while itself being subject to adaptation and refinement over time. Ostrom did not presume community based institutions were successful or ubiquitous. Community based institutions required systematic study. To facilitate research on these institutions across diverse resource systems, Ostrom worked for decades on developing a scientific approach to studying and evaluating institutions. She devoted incredible energy to methodology, bridging disciplines, and enabling systematic, collaborative social science. To systematize research, she developed the Institutional Analysis and

Development (Ostrom's IAD) framework. It encourages interdisciplinary research and seeks to avoid path dependencies from

The risk of model-induced myopia that Ostrom identified also provides a strong basis for taking a pluralistic approach to thinking about, and teaching, economics, especially if one cannot go out and study reality as Ostrom did. I discuss the IAD framework as a prominent example, but the reader should understand that Ostrom extended her ideas to the development of a more complex framework for the analysis of Social-Ecological Systems (Ostrom, 2009). Moreover, even when applying the IAD framework, the specific context shaped the research protocols. For example, as reported in Hayes and Ostrom (2005), Ostrom and colleagues associated with the Center for the Study of Institutions, Population, and Environmental Change (CIPEC) and the Workshop in Political Theory and Policy Analysis, both at Indiana University, developed a complex question-based framework tailored for analyzing forests:

Our research team spent two years developing a series of ten protocols, that enable scholars to examine the impact of diverse ways of owning and governing forests (such as individual ownership, joint ownership by a

Electronic copy available at: <https://ssrn.com/abstract=2252133>

Journal of Institutional Economics (forthcoming 2013)

Interdisciplinary or methodological blinders, problems akin to the model-induced myopia discussed above. The IAD framework structures a common set of research questions to apply across diverse contexts. Ostrom (2005: 28-29) explained the relationships between a research framework, theories, and models:

The development and use of a general framework helps to identify the elements (and the relationships among these elements) that one needs to consider for institutional analysis. Frameworks . . . provide the most general set of variables that should be used to analyze all types of settings relevant for the framework. . . . The development and use of theories enable the analyst to specify which components of a framework are relevant for certain kinds of questions and to make broad working assumptions about these elements. Thus, theories focus on parts of a framework and make specific assumptions that are necessary for an analyst to diagnose a phenomenon, explain its processes, and predict outcomes. . . . Microeconomic theory, game theory, transaction cost theory, social choice theory, public choice, constitutional and covenantal theory, and theories of public goods and common-pool resources are all compatible with the IAD framework (Ostrom, 2006).

The development and use of models make precise assumptions about a limited set of parameters and variables. Logic, mathematics, game theory models, experimentation and simulation, and other means are used to explore the consequences of these assumptions systematically on a limited set of outcomes. Multiple models are compatible with most theories. . . . The framework-driven approach is functionalist. It seeks to integrate theoretical and empirical research in coherent manner. Critically, Ostrom did not reject theories or models, but instead embraced the idea that different theories and models could work better for some observed phenomena than for others.

The IAD framework aims to systematize research efforts by facilitating a more rigorous evaluation by matching and testing of theories and models with observed phenomena, and most generally, enable learning over time (Madison, Frischmann and Strandburg, 2010a: 678). It depends heavily on empirical data, and consequently, on a systematic approach to gathering data. The IAD framework identifies the most general set of variables that should be used to analyze all types of settings relevant for the framework

and divides the investigation of such variables into \n\ngroups.\n10\n\n The first group is exogenous variables and includes biophysical characteristics, \n\ncommunity attributes, and \u201crules-in-use\u201d (or governance mechanisms). With respect to the \n\n\ncommunity, and different forms of government ownership) on investment, harvesting, protection, and managing \n\nactivities and their consequences on forest conditions, including biodiversity\u201d (Hayes and Ostrom, 2005: 603-604). \n9 She did reject the idea of a one-size-fits-all theory. \n10 The following four paragraphs are adapted from Madison, Frischmann and Strandburg (2010a: 678-680). \n\nElectronic copy available at: <https://ssrn.com/abstract=2252133>\n\n\nJournal of Institutional Economics (forthcoming 2013) \n\n \n\n9 \n\n \n\nanalysis of a particular situation, these attributes of a commons are fixed. In the case of the \n\nlobster fishery, for example, these attributes might include the relevant biological characteristics \n\nof lobsters, such as the rates at which they age and reproduce; attributes of the community of \n\nfishermen, such as the proximity in which they live to others, the existence of familial \n\nrelationships, and the skill sets needed for lobster fishing; and the rules\u201dexplicit or informal\u201d\n\nthat govern fishing. \n\nThe second group is the \u201daction arena,\u201d which \u201drefers to the social space where participants with \n\ndiverse preferences interact, exchange goods and services, solve problems, dominate one \n\nanother, or fight (among the many things that individuals do in action arenas)\u201d (Ostrom, 2005: \n\n14). In other words, the \u201daction arena\u201d is the context in which the exogenous variables combine \n\nin particular instances, leading over time to observed patterns of interactions and outcomes. \n\nOstrom\u2019s work emphasizes the diversity of possible combinations of exogenous variables that \n\ndetermine what actually happens in particular instances and, hence, the outcomes that result. The \n\nrules governing lobster fishing contribute to the activity\u2019s long-term sustainability, for example, \n\nbut the patterns of interaction actually observed depend on the richness of the particular \n\nenvironment for lobsters, the degree to which rules are actually enforced, seasonal factors such \n\nas weather, and interaction with outside influences such as pollution and the state of the larger \n\neconomy. Understanding the observed success or failure of a commons enterprise such as a \n\nlobster fishery may require accounting for all of these factors, even though it may turn out that \n\noutcomes are relatively impervious to some of them. \n\nThe foundation of the framework-driven analysis is structuring questions in clusters about the \n\nexogenous variables, the action arena, and the patterns of interactions and outcomes. This \n\napproach aims to systematize data gathering across complex, diverse phenomena while \n\nremaining amenable to diverse disciplinary perspectives and empirical methodologies. \n\nOne interesting aspect of the IAD framework is its accommodation of and heavy reliance on case \n\nstudies. Case studies are an important component to the research program because case studies \n\nprovide rich, detailed descriptions of institutional arrangements in context. In addition, case \n\nstudies provide feedback for the research framework itself.\n11\n\nOf course, case studies also slow \n\n\n11 To implement the IAD framework, Ostrom and her collaborators employed a three-pronged approach: First, they \n\nengaged in a broad range of case studies of natural resource commons to form a basis for a bottom-up practice-based \nntaxonomy of successful and unsuccessful approaches to resource management. Second, they developed a \n\nframework, based on the initial case studies, for identifying the variables that are significant in determining the \n\nsuccess or failure of a commons enterprise and

of the viability of institutions in particular contexts. Third, they preserved flexibility in their framework so that it could be adapted and revised in response to learning derived from the case studies. Based on the information obtained by applying their framework to structured case studies, they developed theories and models for particular commons situations, designed experiments to test those theories, and advanced a set of design principles for successful natural resource commons (Madison, Frischmann and Strandburg, 2010a: 676-677). Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013) things down, making the empirical work more laborious, contentious, and incremental. Arguably, this is a virtue. Good (social) scientific research often takes time. A framework driven approach is particularly attractive for studying the complex interactions between ecological and social (institutional) systems because of the many different disciplines and methodologies that must be brought to bear if progress is to be made (Ostrom, 2009). Ostrom's embrace of complexity goes further than studying reality and adopting a framework to accommodate different theories and methodologies. She also embraced collaboration among different people, disciplines, and cultures. She worked hard to establish a common ground in the fractured academic world of the natural and social sciences (Becker and Ostrom, 1995: 114). Her work was forcefully interdisciplinary, and throughout her career, she called on various disciplines to remove their disciplinary blinders. In her Presidential Address to the American Political Science Association, for example, Ostrom called for expansion of the type of research methods regularly used in political science and suggested that more understanding is required across the social and biological sciences (Ostrom, 1998). Ostrom recognized that studying commons requires a kind of commons of its own, an interdisciplinary community for sharing skills, knowledge, research, and experience. So she built one. With an ad hoc group of scholars including political scientists, anthropologists, economists, historians, and natural resource managers she founded the International Association for the Study of the Commons. She was the first President of the IASC. The IASC's three goals are 1. to encourage exchange of knowledge among diverse disciplines, areas, and resource types; 2. to foster mutual exchange of scholarship and practical experience; and 3. to promote appropriate institutional design. In pursuit of these goals, the IASC hosts major international conferences, publishes The Commons Digest and the International Journal of the Commons, and engages in many other activities that promote knowledge sharing and build social capital and connections among those concerned with commons. Ostrom's legacy is most vividly seen in the thousands of people around the world, in many different disciplines and professional settings, who consider themselves a part of the research commons she helped construct.

Actually, she built many. Of particular note, with her husband Vincent Ostrom, also a renowned political scientist, she founded the Workshop in Political Theory and Policy Analysis. The Workshop is an autonomous research center at Indiana University dedicated to the interdisciplinary, collaborative, and comparative study of institutions (see Indiana University Bloomington, 2008). In honor of the couple, IU renamed the workshop, The Vincent and Elinor Ostrom Center for Advanced Studies in Political Theory and Policy Analysis. The file is too long and its contents have been truncated.

"search_result_idx": null, "evidence_text": "source"}, "url": "file-
 mrPVQDMfIU0exlGC6VME4ga"}}, {"start_ix": 2288, "end_ix": 2298, "citation_format_type":
 "tether_og", "metadata": {"type": "file", "name": "Week 1_Beyond the Tragedy of the
 Commons.pdf", "id": "file-kY5KZqqCLsf87fkcfF02e0Bt", "source": "my_files", "text":
 "\nContents lists available at ScienceDirect\n\nEnergy Research & Social
 Science\n\njournal homepage: www.elsevier.com/locate/erss\n\nPerspectives\n\nBeyond
 the tragedy of the commons: Reframing effective climate change\ngovernance\n\nAnthony
 Patt\nETH Z\u00fcrich, Switzerland\n\nA R T I C L E I N F O\n\nKeywords:\nClimate
 policy\nTragedy of the commons\nGlobal commons problem\nTechnological transitions\n\nA
 B S T R A C T\n\nThe tragedy of the commons provides a powerful narrative for a class
 of environmental problems, and serves to\nframe them in a way that allows people to
 identify effective solution strategies. But the problem frame also rests\non a set of
 factual and value-based assumptions, and is inappropriate to guide decision-making
 when these\nassumptions are violated. The climate change mitigation challenge \u2013
 reducing greenhouse gas emissions, mainly\nfrom the energy sector, to limit global
 warming to less than 1.5 or 2 \u00b0C \u2013 violates these assumptions.
 Climate\nchange requires us not to reduce, but to completely prohibit greenhouse gas
 emissions. Before any such\nprohibition is feasible, it is first essential to develop
 a clean energy system that can meet our basic needs. The\nmain barriers to this are
 not economic, but rather are associated with evolving knowledge, networks,
 and\ninstitutions. Framing climate change in evolutionary terms can help us to
 appraise policy options more\neffectively, and ultimately identify those that get us
 where we need to go.\n\n1. The tragedy of the commons\n\nThe biologist and ethnic
 nationalist Garrett Hardin wanted society\nto restrict people\u2019s reproductive
 freedom, and believed that only those\nparents who would raise their children the
 right way should be entitled\nto have babies [1,2]. To support this politically
 charged belief, Hardin\ndeveloped an argument based on the idea of the tragedy of the
 commons,\na game theoretic model involving farmers\u2019 letting their cows graze
 on\nthe communally owned village green [3]. Every farmer obtains the full\nbenefit of
 placing an extra cow on the commons to graze, while\nsuffering only a small share of
 the cost to the community as a whole,\nin terms of less grass being available to the
 other cows. Overgrazing is\nthe inevitable equilibrium, unless the community as a
 whole steps in.\n\nLimiting the number of cows, and ideally allocating them to
 those\nfarmers who can manage them most profitably, is the obvious solution.\n\nThe
 lesson transferred well to the point Hardin was trying to make\nabout people in his
 now famous article.\n\nToday, few would use a tragedy of the commons framing, or
 related\nterms such as commons problem, common pool resource problem,
 or\nexternalities problem, to describe the issue of human population growth.\n\nThis is
 largely because the world has witnessed birthrates falling\nglobally, on most
 continents to below replacement levels, as a result\nof factors Hardin didn\u2019t
 consider: the education of women, reductions in\ninfant mortality, and urbanization
 [4,5]. But most analysts do use\nHardin\u2019s idea to describe other environmental
 problems, most notably\nclimate change, and based on this framing suggest a strategy
 similar to\n\nwhat Hardin advocated [6]. The framing may be appropriate for some\nof
 these problems, fisheries management being an example that comes\nto mind. But it is
 not appropriate for climate change, and the sooner we\nstop framing climate change in
 this way, the better.\n\nAs a starting point, it is worth considering what the key
 aspects of a\ncommons problem actually are. Hardin himself described four, and\nthese
 are as valid today as they were then. First, of course, there needs\nto be a common

pool resource, such as the grass on a village green, or the global carrying capacity for people. Second, there needs to be a use of that resource, or an activity that depletes it, that is legitimate and valuable, accepted by society at large. In Hardin's model, we do want cows to graze on the village green, as long as they do so productively, just as we do want a planet that is home to people. In fact, because the resource is so valuable, we want to ensure that it takes place in a manner that is both optimal and sustainable. Third, the common-pool nature of the resource has to be the thing that leads people to overuse or over-deplete the resource, to the point that is clearly suboptimal, perhaps even exceeding its sustainable limits. Fourth, there cannot be a technical solution. By this, Hardin meant that it is not possible to use technology to expand the resource in order to continually accommodate the growing use. The tragedy of the commons acts a problem frame. The effect of a problem frame is to take a complex issue which affects multiple values and can be considered from a variety of perspectives and to simplify it around one particular conceptualization, leading to one particular solution strategy [7]. In the case of this framing, it is the third

aspect
<http://dx.doi.org/10.1016/j.erss.2017.05.023>
 Received 16 May 2017; Accepted 18 May 2017
 E-mail address: anthony.patt@usys.ethz.ch.
 Energy Research & Social Science 34 (2017) 1–13
 Available online 27 May 2017
 2214-6296/ © 2017 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY license

(<http://creativecommons.org/licenses/by/4.0/>).
<http://www.sciencedirect.com/science/journal/22146296>
<http://www.elsevier.com/locate/erss>
<http://dx.doi.org/10.1016/j.erss.2017.05.023>
<mailto:anthony.patt@usys.ethz.ch>
<https://doi.org/10.1016/j.erss.2017.05.023>
<http://crossmark.crossref.org/dialog/?doi=10.1016/j.erss.2017.05.023&domain=pdf>
 listed in the paragraph above that is crucial. The common-pool ownership structure, meaning that agents do not pay the full cost of their use, is seen as the driving force behind their overuse. Framing a problem as a tragedy of the commons automatically implies that if one could privatize the ownership structure, or make the agents pay the full costs to society of their use of the resource, then an optimal outcome would be achieved. In the case of a village green, the easy solution is to divide it up with fences, and have each subdivided plot belong to a single farmer. In the case of a resource that cannot be subdivided so easily, like the global carrying capacity for humans, then the solution is only slightly more complicated. Either one has to establish a limited number of rights to use the resource, and allocate these to people in advance, or one has to charge people ex post for their use of the resource. An important feature of the model is that the solution increases the resource's overall productivity. And that means that as long as the allocation mechanism or tax is fair, then reaching an agreement to privatize the use rights or internalize their costs should be politically feasible. But the usefulness of such policy guidance depends on the underlying applicability of the problem frame. The presence of a common-pool resource does not guarantee that Hardin's solution strategy is the best; the problem frame ceases to provide useful guidance if any of the other three criteria are violated. A case that illustrates failure on the second of the four criteria is the act of murdering one's neighbor. This depletes the common pool resource of public safety, but murder is not an activity that we want, so we don't solve it by imposing a tax or allocating a limited number of permits. We prohibit it. To illustrate failure on the third criterion, drinking alcohol is a

behavior that we tolerate in moderation, and even encourage in some situations, but when people get drunk and start breaking things, they become a public nuisance. Yet we don't believe that internalizing the cost of drunken behavior will get the person on the verge of intoxication to say no to another drink. So we address it by other means, including charging bartenders with cutting people off, and providing treatment programs for alcoholism. To illustrate failure on the fourth criterion, the local public school may be overcrowded, but we can solve this by enlarging the building and hiring more teachers. So we do that, rather than limiting the number of places available or imposing high school fees. Failure on any of these criteria matters. Climate change fails on all three.

2. Why climate change fails the tragedy of the commons criteria

Many people see the 2015 Paris Agreement as representing a turning point in climate governance, but in fact the events that foreshadowed Paris occurred a decade prior to then, culminating in 2007. It was then that the idea of the 2 °C target gained popularity, based on risk management arguments, and was incorporated into a global action plan agreed to in Bali, Indonesia, at the closing of a failed set of negotiations to extend or replace the Kyoto Protocol [8, 2013]. Paris built on this decision, and added an additional level of ambition by suggesting the desirability of limiting climate change to 1.5 °C. More importantly, Paris set up a process that could help countries to take the steps to achieve one or the other, in terms of a regular global stocktake, as well as a set of mechanisms to provide financial and capacity-building support to developing countries.

The one thing that the Paris Agreement does not include is a set of negotiated binding national targets, of the kind that are the heart of the Kyoto Protocol. In fact, the failed desire to include such binding targets is what led to the eight-year delay, starting in Bali. And yet this failure should not surprise us, for a simple reason. The tragedy of the commons framing suggests that negotiating binding targets should be politically infeasible, with the main hurdle being the identification of a mutually acceptable allocation rule for the net benefits. But this presupposes that the global target is one that will maximize the value to society of whatever activity it is that degrades the common pool resource. Partial decarbonization as per Kyoto could take place by eliminating inefficiencies in the energy system, and arguably could deliver immediate net economic benefits; negotiating the allocation rule took less than two years. Achieving the Paris targets of 2 °C or 1.5 °C, however, requires that net anthropogenic emissions of greenhouse gases into the atmosphere cease entirely in the second half of this century [11].

Finding immediate net benefits to allocate that are associated with a complete halting of emissions is more or less impossible, and so negotiating such an agreement required convincing people to pay attention to large benefits anticipated in the future, in some cases centuries hence [12, 8]. So the temperature target qualitatively changed the character of negotiations, making them far more difficult, arguably impossible.

More fundamentally, the need to eliminate emissions entirely, essentially as soon as possible, makes those emissions something that society will no longer tolerate. So climate change fails the second of the four criteria Hardin identified, just like murder.

There has been another major change since about 2007, and that is the recognition that the medium-term costs of eliminating greenhouse gas emissions are likely to be trivial, and may in fact be negative, even before considering the long-term benefits from avoided climate impacts [13, 14]. What drove this recognition was the realization from the field of evolutionary economics that

policies to expand renewable energy\also make them cheaper [15,16]. This fact has become especially salient\lately, as the costs of supplying energy from some renewable resources\have fallen to below those of fossil fuels [17], especially if one takes\into account local environmental effects such as air pollution or water\ndemand [18]. A study in the United States, for example, examined the\avoided local and regional environmental impacts associated with\ninstalling wind and solar power instead of new coal capacity, and\nfound the value of those impacts to be far larger than the difference in\ncost between the two technologies [19]. As another example, the costs\nto own and drive an electric car charged by wind or solar power are\napproaching parity with those of a conventional gasoline model, at least\nunder some conditions [20].\n\nThese trends suggest two additional ways in which the tragedy of\nthe commons framing fails for climate change. First, there is no longer a\nnecessary misalignment of incentives between the emitters of green-\nhouse gases and society at large. Every country, with the possible\nexception of major oil and gas exporters, has reason to mitigate climate\nchange and transform its national energy sector away from fossil fuels,\nregardless of what other countries may do. Every household will soon\nhave a financial incentive to stop burning oil and gas, regardless of\nwhat their neighbors do. So if fossil fuels are still in business, it will not\nbe because of an unjust cost advantage, born from the existence of an\nexternality. Climate change is like the example of public drunkenness:\ninternalizing the cost will not change anything qualitatively. Second, it\nnow appears that a technical solution does exist for climate change.\nIntegrated assessment models suggest that by switching to non-fossil\nenergy sources, we can continue to see global economic activity grow,\nat roughly the same pace, even as greenhouse gas emissions come to a\nhalt [21]. Climate change is like enlarging the public school.\n\n3. Framing today\u2019s challenge in evolutionary terms\n\nBut we still have a problem needing to be solved. Using electric cars\nas an example, a household may soon have a financial incentive to\nswitch over from their gasoline model, but it will not do so unless there\nis a dense network of charging stations where they want to take long\ntrips. At the same time, there is no business case to install such a\nnetwork as long as the number of electric cars on the road remains low.\nThis is a chicken and egg problem: you need a chicken to get an egg, but\nan egg to get a chicken. Similar problems exist across the energy sector.\nAt the most general level, we need to prohibit greenhouse gas\nemissions, which almost certainly means prohibiting fossil fuels. But\nwhich comes first: prohibition, or clean energy? Before prohibition can\nbe politically and socially feasible, we need a clean energy system that\n\nA. Patt Energy Research & Social Science 34 (2017) 1\u201333\n\nis good enough to sustain us. Yet given more than a century already\nspent improving and optimizing an energy system based on fossil fuels,\nthe first steps towards a clean energy system are necessarily expensive,\nclunky, and unreliable. Most of the improvements to the clean energy\nsystem \u2013 built around new knowledge, networks, and institutions \u2013 only\ncome once we start relying on it. Progress can occur, but without policy\nintervention, it will be slow. It took millions of years to get a chicken\negg when the starting point was a dinosaur. Accelerating evolution is\nthe key challenge for climate policy.\n\nJust as the tragedy of the commons framing offered clear guidance\nin terms of the appropriate policy instruments, so too does an\nrevolutionary framing, based on insights from the emerging scientific\nstudy of socio-technical transitions [22]. Our policy instruments need to\nbe those that build the new knowledge, networks, and institutions that\nwill

enable a clean energy system to function smoothly and affordably, which is a prerequisite to phasing out fossil fuels. When we think about all of the policies that support renewable energy innovation and deployment – state-sponsored R & D, tax credits or feed-in tariffs for project developers, and streamlined permitting processes for green infrastructure – that is exactly what is going on. As they create a new system that is viable, these policies lay the groundwork for a second generation of sectoral regulations, already beginning to appear, which prevent new investment into fossil fuel infrastructure. If you frame climate change as an evolutionary problem, it is this sequence of policy instruments that makes the most sense [23].

The issue of how we frame climate change mitigation is important, precisely because the two framings point us in different directions with respect to policy. When there is a true tragedy of the commons, then neo-classical economics and game theory provide a solid basis to favor market-based instruments, those that allocate limited rights to deplete the resource or internalize the costs of doing so [24]. Confusion can arise, however, because proponents of market-based instruments also suggest that these will provide the needed stimulus for innovation, promoting systemic change [25,26]. But just because these instruments are the best solution to one kind of problem does not mean they are very good or effective with respect to another. In fact, a growing literature shows that they aren't, and that the effective policies to stimulate a transition are those that directly support the development of new knowledge, networks, and institutions, directly addressing the barriers to systemic change [27]. The choice of how we frame climate change dictates the terms by which we evaluate the relative strengths and weaknesses of the different possible solution strategies. Judged by the appropriate criteria, market instruments are generally a poor fit.

The tragedy of the commons framing made sense at a time when we believed that people needed to adjust the energy system at the margins, and believed that the cost of doing so would be high. We no longer believe these things. The atmosphere may be a common pool resource, but using it as a place to put our greenhouse gas emissions is no longer something for which we have any long-term rights to allocate. To prohibit dumping our greenhouse gases there, we first need to accelerate a technological transition towards non-fossil sources of energy, for which the main barriers have to do with knowledge and networks, rather than an inherent difference in cost. Policies providing active and direct governmental support for new technologies and technological systems can change the conditions that hold the new technologies back. In fact they have already done a great deal; they have led to a dramatic decline in the costs of key energy technologies, and contributed to the possibility that global emissions have already peaked. There is still more work to be done, and we can solve climate change if we build on what we have learned. At all costs, we should resist the temptation to reverse course because the policies don't fit one man's convenient story of too many cows on a village green.

Acknowledgment

Funding for the development of the ideas expressed in this article came from European Research Council Starting Grant number 313553.

References

[1] G. Hardin, The tragedy of the commons, *Science* 162 (3859) (1968) 1243–1248.

[2] J. Oakes, Garrett Hardin's tragic sense of life, *Sci. Publ. Eye* 40 (4) (2016) 238–247, <http://dx.doi.org/10.1016/j.endeavour.2016.10.007>.

[3] J. Nash, Equilibrium points in N-person games, *Proc. Natl. Acad. Sci. U. S. A.* 36 (1950) 48–49.

[4] United Nations Population Division, *World Population Prospects: The*

2006 Revision, United Nations Department of Economic and Social Affairs, 2007, <http://unesa.un.org/unpp>.

[5] W. Lutz, J. Crespo Cuaresma, W. Sanderson, The demography of educational attainment and economic growth, *Science* 319 (2008) 1047-1048.

[6] R. Stavins, J. Zou, T. Brewer, M. Conte Grand, M. Elzen, M. den Finus, J. Gupta, N. Hoffmann, M. Lee, A. Michaelowa, M. Patterson, K. Ramakrishna, G. Wen, J. Wiener, H. Winkler, International cooperation: agreements & instruments, *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, UK and New York, USA, 2014, pp. 1001-1082.

[7] D. Chong, J. Druckman, Framing theory, *Annu. Rev. Polit. Sci.* 10 (2007) 103-126.

[8] T. Barker, The economics of avoiding dangerous climate change. An editorial essay, *The Stern Review*, *Clim. Change* 89 (3) (2008) 173.

[9] K. Hasselmann, T. Barker, The Stern Review and the IPCC fourth assessment report: implications for interactions between policymakers and climate experts. An editorial essay, *Clim. Change* 89 (2008) 219-229.

[10] S. Randalls, History of the 2 °C climate target, *Wiley Interdiscip. Rev. Clim. Change* 1 (4) (2010) 598-605, <http://dx.doi.org/10.1002/wcc.62>.

[11] M. Meinshausen, N. Meinshausen, W. Hare, S.C.B. Raper, K. Frieler, R. Knutti, D.J. Frame, M.R. Allen, Greenhouse-gas emission targets for limiting global warming to 2 °C, *Nature* 458 (7242) (2009) 1158-1162, <http://dx.doi.org/10.1038/nature08017>.

[12] N. Stern, *The Economics of Climate Change*, Cambridge University Press, Cambridge, UK, 2007.

[13] O. Edenhofer, N. Bauer, E. Kriegler, The impact of technological change on climate protection and welfare: insights from the model MIND, *Ecol. Econ.* 54 (2005) 277-292.

[14] IPCC, *Climate Change 2014: Mitigation of Climate Change. Working Group III Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, in: O. Edenhofer, R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eikemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel, J. Minx (Eds.), Cambridge University Press, Cambridge, UK and New York, USA, 2014.

[15] W.B. Arthur, Competing technologies, increasing returns, and lock-in by historical events, *Econ. J.* 99 (1989) 116-131.

[16] L. Argote, D. Epple, Learning curves in manufacturing, *Science* 247 (4945) (1990) 920-924.

[17] B. Obama, The irreversible momentum of clean energy, *Science* 355 (2017) 126-129, <http://dx.doi.org/10.1126/science.aam6284>.

[18] P.G. Bain, T.L. Milfont, Y. Kashima, M. Bilewicz, G. Doron, R.B. Garborsdottir, V.V. Gouveia, Y. Guan, L.-O. Johansson, C. Pasquali, V. Corral-Verdugo, J.I. Aragones, A. Utsugi, C. Demarque, S. Otto, J. Park, M. Soland, L. Steg, R. Gonzalez, N. Lebedeva, O.J. Madsen, C. Wagner, C.S. Akotia, T. Kurz, J.L. Saiz, P.W. Schultz, G. Einarsdottir, N.M. Saviolidis, Co-benefits of addressing climate change can motivate action around the world, *Nat. Clim. Change* 6 (2) (2016) 154-157.

[19] K. Siler-Evans, I.L. Azevedo, M.G. Morgan, J. Apt, Regional variations in the health, environmental, and climate benefits of wind and solar generation, *Proc. Natl. Acad. Sci.* 110 (29) (2013) 11768-11773, <http://dx.doi.org/10.1073/pnas.1221978110>.

[20] J. Riesz, C. Sotiriadis, D. Ambach, S. Donovan, Quantifying the costs of a rapid transition to electric vehicles, *Appl. Energy* 180 (2016) 287-300, <http://dx.doi.org/10.1016/j.apenergy.2016.07.131>.

[21] L. Clark, K. Jiang, K. Akimoto, M. Babiker, G. Blanford, K. Fischer-Vanden, J.-C. Hourcade, V. Krey, E. Kriegler, A. Löffelschel, D. McCollum, S. Paltsev, S. Rose, P.R. Shukla, M. Tavoni, B.C.C. van der Zwaan, D.P. van Vuuren, Assessing transformation pathways, *Climate*

Change 2014: Mitigation of Climate Change.\nContribution of Working Group III to the Fifth Assessment Report of the\nIntergovernmental Panel on Climate Change, Cambridge University Press,\nC\nCambridge, UK and New York, USA, 2014, pp. 413\u2013510.\n\n[22] F. Geels, Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study, Res. Policy 31 (2002) 1257\u20131274.\n\n[23] A. Patt, Transforming Energy: Solving Climate Change with Technology Policy,\nC\nCambridge University Press, New York, 2015.\n\n[24] P. Portney, R. Stavins, Public Policies for Environmental Protection, Resources for the Future, Washington, 2000.\n\n[25] R. Naam, The Infinite Resource: The Power of Ideas on a Finite Planet, University Press of New England, Lebanon, NH, 2013.\n\n[26] E. Somanathan, T. Sterner, T. Sugiyama, D. Chimanikire, N.K. Dubash, J. Essandoh-Yeddu, S. Fifita, L. Goulder, A. Jaffe, X. Labandeira, S. Managi, C. Mitchell, J.P. Montero, F. Teng, T. Zylicz, National and sub-national policies and institutions,\nC\nClimate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK and New York, USA, 2014, pp. 1141\u20131205.\n\n[27] M. Grubb, Planetary Economics: Energy, Climate Change and the Three Domains of Sustainable Development, Earthscan, London, 2014.\n\nA. Patt Energy Research & Social Science 34 (2017) 1\u20133
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0005
http://dx.doi.org/10.1016/j.endeavour.2016.10.007
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0015
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0015
http://esa.un.org/unpp
http://esa.un.org/unpp
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0025
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0025
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0035
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0040
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0040
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0045
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0045
http://dx.doi.org/10.1002/wcc.62
http://dx.doi.org/10.1038/nature08017
http://dx.doi.org/10.1038/nature08017
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0060
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0060
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0065
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0065
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0065
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070
http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070

3/sbref0075\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0075\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0080\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0080\http://dx.doi.org/10.1126/science.aam6284\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090\http://dx.doi.org/10.1073/pnas.1221978110\http://dx.doi.org/10.1016/j.apenergy.2016.07.131\http://dx.doi.org/10.1016/j.apenergy.2016.07.131\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0110\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0110\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0115\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0115\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0120\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0120\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0125\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0125\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0135\http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0135\n\n\tBeyond the tragedy of the commons: Reframing effective climate change governance\n\tThe tragedy of the commons\n\tWhy climate change fails the tragedy of the commons criteria\n\tFraming challenge in evolutionary terms\n\tAcknowledgment\n\tReferences\n\n\n\n\n", "extra": {"cited_message_idx": 9, "search_result_idx": null, "evidence_text": "source"}, "url": "file-kY5KZqqCLsf87fkcfFO2e0Bt"}}}, {"start_ix": 3979, "end_ix": 3990, "citation_format_type": "tether_og", "metadata": {"type": "file", "name": "Week 1_Two Enduring Lessons from Elinor Ostrom.pdf", "id": "file-mrPVQDMfIUOexlGC6VME4ga", "source": "my_files", "text": "\nElectronic copy available at: http://ssrn.com/abstract=2252133Electronic copy available at: http://ssrn.com/abstract=2252133\n\n \n \n \n \n \n \n Benjamin N. Cardozo School of Law \u00b7 Yeshiva University \nJacob Burns Institute for Advanced Legal Studies \n\nMarch, 2013 \nFaculty Research Paper No. 387 \n\n \n \n \n \n \n \n Two Enduring Lessons \nfrom Elinor Ostrom \n\n \nJournal of Institutional Economics (forthcoming 2013) \n\n \n \n \n \n \n \n Brett M. Frischmann

\nProfessor of Law & Director, Cardozo Intellectual \n\nProperty and Information
 Law Program \nBenjamin N. Cardozo School of Law \n\n55 Fifth Avenue, Room 1004 \nNew
 York, NY 10003 \n\n(212) 790-0859 (phone) \nfrischma@yu.edu \n\n \n \n \n\nElectronic
 copy available at: <https://ssrn.com/abstract=2252133>\n\n\n\nElectronic copy available
 at: <http://ssrn.com/abstract=2252133>Electronic copy available at:
<http://ssrn.com/abstract=2252133>\n\nJournal of Institutional Economics (forthcoming
 2013) \n\n \n\n1 \n\n \n\nTwo Enduring Lessons from Elinor Ostrom \n\nBrett M.
 Frischmann\n1\n \n\nBenjamin N. Cardozo School of Law \n\nYeshiva University \n\nNew
 York, NY \n\nfrischma@yu.edu \n\n \n\nAbstract: \n\n \n\nThis article is a tribute to
 Elinor Ostrom. It explores two enduring lessons she taught: a \n\nsubstantive lesson
 that involves embracing complexity and context, and a methodological lesson \n\nthat
 involves embracing a framework-driven approach to systematic, evolutionary learning
 \n\nthrough various interdisciplinary methodologies, theories, and empirical
 approaches. \n\n \n\nFirst, I discuss Ostrom\u2019s work on environmental commons. I
 illustrate the two lessons through a \n\ndiscussion of the tragedy of the commons.
 Next, I explain how the two lessons play a significant \n\nrole in recent efforts to
 extend Ostrom\u2019s work on environmental commons to knowledge/cultural \n\ncommons.
 I draw a parallel between the tragedy of the commons allegory and the free rider
 \n\nallegory, and show how many of the problems Ostrom explored in the environmental
 context are \n\nmanifest in the cultural environmental context. I discuss an ongoing
 research project that follows \n\nthe path that Ostrom blazed and systematically
 studies commons in the cultural environment. \n\n \n\n*****
 \n\n \n\nElinor Ostrom taught many lessons, as an amazing mentor, teacher, scholar,
 and human being. \n\nShe had a profound influence on me, and I am honored to offer
 this tribute to her. \n\nLike many others, I was inspired by Ostrom\u2019s design
 principles for natural resource commons \n\nand the demonstrated feasibility of
 community-based management for shared resources, and I \n\ntried to follow her lead.
 In fact, my first academic talk was about lessons from the literature on
 \n\nenvironmental commons that map to the study of other types of resource commons,
 such as \n\ninformation and Internet commons. I will return to the theme of that talk
 here. I will not discuss \n\nher theoretical or empirical contributions as such; many
 others have done so and will continue to \n\ndo so, and for good reason. Instead, I
 will discuss two enduring lessons Ostrom taught about \n\nsocial science
 research.\n2\n \n\nThe two lessons can be summarized as follows: \n\n
 \n1 The author wishes to thank the editor-in-chief, two anonymous referees, Michael
 Burstein, Daniel Cole, Michael \n\nMadison, Al Roundtree, Charles Schweik, Alex Stein,
 and Katherine Strandburg for their constructive comments \n\nand suggestions. The
 usual disclaimer applies. \n2 Throughout this article, I refer to contributions made
 by Ostrom and do not list all of her many collaborators \nor people who also made
 related contributions. But I want to be clear that she collaborated with many others
 \nand she readily acknowledged the independent contributions of many others working on
 similar issues. \n\nElectronic copy available at:
<https://ssrn.com/abstract=2252133>\n\n\n\nJournal of Institutional Economics
 (forthcoming 2013) \n\n \n\n2 \n\n \n\nSubstantive Lesson: Embrace complexity and
 context\u2014or simply, reality; avoid \n\ndistorting reductionism and overstated
 gains from simple models. \n\nMethodological Lesson: Embrace systematic, evolutionary
 learning through various \n\ninterdisciplinary methodologies, theories, and empirical
 approaches, including case \n\nstudies; be aware of, and try to avoid, path
 dependencies from disciplinary or \n\nmethodological blinders. \n\nThe first lesson

leads to the second. Anyone can say that one should embrace complexity and study reality, and many people do. What makes Elinor Ostrom incredibly special is that she worked tirelessly to develop a robust framework for doing it, and she did it, time and again, and in a collaborative way that built an international interdisciplinary community. In Part I, I discuss Ostrom's work on environmental commons. I illustrate the two lessons in the environmental context with a discussion of the tragedy of the commons. Ostrom's theoretical and empirical contributions probably are best recognized in the environmental context. Her contributions extend much further, as the Nobel Prize Committee recognized when it awarded her the 2009 prize along with Oliver Williamson. Still, there is plenty of work to be done in exploring and extending her contributions in other contexts. In Part II, I focus on that exploration and explain how the two lessons play a significant role in recent efforts to extend Ostrom's work on environmental commons to knowledge/cultural commons. I draw a parallel between the tragedy of the commons allegory and the free rider allegory, and then show how many of the problems Ostrom identified and explored in the environmental context are manifest in the cultural environmental context. I briefly discuss an ongoing research project that aims to follow the path that Ostrom blazed and systematically study commons in the cultural environment. I. Two Lessons from Ostrom's Work on Environmental Commons Elinor Ostrom's pioneering work challenged the notion that rational human beings would be helplessly trapped in social dilemmas. Much of her work focused on environmental commons and confronted the then-dominant and still powerful concept of the tragedy of the commons. The term commons would generally conjure up the notion of a shared community resource, such as a public park or a common pasture. The term gained considerable notoriety among economists, political scientists, and other social scientists after the publication of Garrett Hardin's essay The Tragedy of the Commons in Science (1968). Hardin (1968: 1244) described the tragedy of the commons as follows: Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013) asks, "What is the utility to me of adding one more animal to my herd?" This utility has one negative and one positive component. 1) The positive component is a function of the increment of one animal. Since the herdsman receives all the proceeds from the sale of the additional animal, the positive utility is nearly +1. 2) The negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all the herdsmen, the negative utility for any particular decision-making herdsman is only a fraction of -1. Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another; and another.... But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all. Hardin's formulation has

been the subject of extensive analysis and critique. At its core, the tragedy of the commons allegory illustrates a standard externality problem—each individual rationally maximizes his or her private welfare without accounting for external costs, i.e., the costs imposed on others. Avoiding tragedy seems to require collective action to manage use of the shared resource. Simply put, unconstrained consumption is not sustainable, and thus, constraints must be introduced if the resource is to be sustained. What should the constraints consist of? Hardin recognized two (top-down) solutions: government regulation and privatization. Government can constrain consumption by directly managing or regulating use of the shared resource. Alternatively, government can establish a system of private property rights delineating ownership of the resource. The former presumes that the government will take into account the aggregate effects and manage use of the resource efficiently over time, and the latter presumes that well-defined private property rights will facilitate market exchanges and lead to an efficient allocation of access and use rights, and consequently, efficient management of the resource over time (Demsetz, 1967). Both approaches eliminate the commons; no longer do commoners freely choose for themselves how to manage a shared resource, for such freedom, Hardin claims, brings ruin to all. Both approaches rely on collective action through government to introduce constraints. The approaches differ substantially in terms of the manner in which ongoing (month-to-month, day-to-day, minute-to-minute) resource allocation decisions are made.

I include the block quote because it is useful to see what Hardin actually said. Paraphrasing Hardin often leads to adjustments that obscure or improve Hardin's simple story. In Coasian terms, it is a joint cost problem (Coase, 1960). Electronic copy available at: <https://ssrn.com/abstract=2252133>

Journal of Institutional Economics (forthcoming 2013)

The tragedy of the commons allegory became the starting point for examining common pool resource problems and solutions. Many analysts assumed the tragedy of the commons model described a normal problem (at least for common pool resources) and a binary solution set followed: To avoid tragedy, society must turn to government command-and-control (micro-management) or private property-enabled markets. Economists, political scientists, and many others analyzed and debated how well these two types of regulatory solutions work. Will command-and-control regulation by government lead to efficient outcomes or would society be better off relying on private ordering by markets? Elinor Ostrom challenged the entire enterprise at its roots by asking two foundational sets of questions: First, how well does the tragedy of the commons allegory describe reality? Is it a useful theory for making predictions about real-world behavior of individuals sharing common pool resources? Does it describe a normal or exceptional situation? Does it provide a useful basis for choosing or designing regulatory solutions? Second, does the binary choice between government command-and-control regulation and private property-enabled markets reflect the full range of options? Are there alternative (bottom-up) institutions and/or means for collective action? Critically, the two sets of questions are related, particularly when one begins with the tragedy of the commons allegory. Hardin blurred resource system with resource management. In his allegory, the shared resource system is the pasture, and open access sharing among herders is the resource management or governance regime. As did many social scientists, Hardin made a series of assumptions with respect to both resource and resource management

that limit the generalizability of his allegory. As Ostrom (2007: 15183) explained: Hardin envisioned a pasture open to all in which each herder received a direct benefit from adding animals to graze on the pasture and suffered only delayed costs from overgrazing. Translating his metaphor into a theory requires five assumptions: (i) the resource system is a pasture; (ii) no governance system is present related to the resource system; (iii) the mobile individual resource units (the animals grazing on the pasture) can be identified and are the property of their owners and, when fattened, can be sold for cash; (iv) a sufficient number of users, given the size of the pasture, are using the pasture to adversely affect its long-term productivity; and (v) the resource users independently make decisions to maximize their own short-term returns. These five assumptions lead to a theoretical prediction of very high harvesting of the pasture grasses and severe overharvesting or destruction of the ecological system.

Electronic copy available at:
<https://ssrn.com/abstract=2252133>

Journal of Institutional Economics (forthcoming 2013)

Situations characterized by these assumptions, in which individuals independently make anonymous decisions and primarily focus on their own immediate payoffs, do tend to overharvest open-access resources. Researchers have repeatedly generated a tragedy of the commons in experimental laboratories when subjects make independent and anonymous decisions in a common-pool resource setting. Making one small change in the structure of laboratory experiments, a change that is predicted by game theory to make no difference in the predicted outcome, has repeatedly had major impacts on interactions and outcomes. Simply enabling subjects to engage in face-to-face communication between decision rounds enables them to approach socially optimal harvesting levels rather than severely overharvesting the commons. In the face-to-face discussions, participants tend to discuss what they all should do and build norms to encourage conformance.⁵

Note that when the assumptions hold and fully describe the resource setting, the theory's predictions may be useful. But this is exceptional. Reality is considerably more complex. The tragedy of the commons allegory rarely describes shared resource settings in a sufficiently complete manner as to qualify as a useful theory for making predictions or prescribing regulatory solutions. More is needed. Of course, it may be convenient to work within the confines of the allegory or model and perhaps to assume that reality conforms to those confines because doing so makes analysis intractable and leads to a well-defined problem and possible solutions to compare and evaluate. But this is a fundamental mistake and an example of distorting reductionism. It can lead the analyst to miss what is most important and focus on what is least relevant. As Ostrom (2007) explained in the quote above, a slight change, which takes you outside the confines of the model, gives rise to solutions that completely escaped attention and would not be predicted to be relevant. Relaxing one of the assumptions, or just recognizing that some other factor is relevant to the situation, can change everything; cooperation to avoid tragedy becomes theoretically feasible without resort to one of the two solutions. As is now well understood in the field of institutional economics generally, community management, social norms, and other

Ostrom (2000) also critiqued reliance on the rational actor model when analyzing collective action and social dilemmas. After establishing a series of well-substantiated facts about human behavior based on extensive fieldwork:

I believe that one is forced by these well-substantiated facts to adopt a more eclectic (and classical) view of human behavior (Ostrom, 2000: 141). She developed a second-generation model of rationality in which humans are complex, fallible learners who seek to do as well as they can given the constraints that they face and who are able to learn heuristics, norms, rules, and how to craft rules to improve achieved outcomes (Ostrom, 1998: 9). The second-generation model of rationality predicts that reciprocity, reputation, and trust as core relationships can lead to increased net benefits (Ostrom, 1998: 13). This theoretical model identifies individual attributes that are particularly important in explaining behavior in social dilemmas: these attributes include [1] the expectations individuals have about others' behavior (trust), [2] the norms individuals learn from socialization and life's experiences (reciprocity), and [3] the identities individuals create that project their intentions and norms (reputation) (Ostrom, 1998: 14). Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013) 6 Institutional arrangements are relevant solutions that can and often do outperform government regulation and market regulation. Ostrom's contribution goes well beyond recognizing the limits of models and acknowledging what is theoretically feasible. While it is important to understand Ostrom's concerns about model-induced myopia, it is equally if not more important to appreciate how she responded to those concerns. In *Governing The Commons: The Evolution Of Institutions For Collective Action*, for example, Ostrom (1990) explained how models such as the tragedy of the commons lead to myopic analysis of solutions and policy prescriptions. She suggested that neither the Leviathan (government regulation) nor Privatization (market regulation) is a panacea, and that model-induced myopia leads analysts to ignore alternative institutional arrangements that may be more effective tools for governance. But that is merely the beginning literally, chapter one of the book (Ostrom, 1990). Ostrom was a scientist. Her response to concerns about model-induced myopia was to do the scientific work of systematically studying actual resource systems and governance institutions. Over decades, Ostrom demonstrated through a rich empirical program how self-organized community governance often is an effective alternative for a wide range of shared resources. In some contexts, communities can and do solve tragedy of the commons, collective action, and other related resource management problems without (turning to) government regulation or market-driven allocation as a panacea. They do so in a variety of ways, often relying on informal mechanisms for coordinating behavior. Community solutions do not always succeed or always fail; they sometimes succeed and sometimes fail. The temptation to seek out regulatory panaceas based on universal models, whether through private property, state action, or even notions of community, must be resisted in favor of a more nuanced approach (Madison, Frischmann and Strandburg, 2010a: 676). Context matters. Recognizing that people sometimes cooperate effectively and build institutions to enable sustainable shared use of common pool resources opened up the solution space and focused scholarly attention on complexity, context, communities, and institutions. This broader field of vision not only brought informal institutions into view and encouraged their systematic study, but it also improved our understanding of formal institutions by revealing the many different ways that government, market, and community institutions depend on each other to be successful. And it

yielded two significant lessons, one substantive and one methodological.

Ostrom's Substantive Lesson:

As explored in a recent book, Ostrom's vision allows us to appreciate that government regulation of shared environmental resources does not replace or eliminate the commons altogether for that would be the true tragedy! Rather, in many cases, government regulation constructs a semi-commons where a narrow range of resource users/uses are constrained in order to sustain freedom in the commons for a wide range of other resource users/uses (Frischmann, 2012).

Electronic copy available at: <https://ssrn.com/abstract=2252133>
Journal of Institutional Economics (forthcoming 2013)
Embrace complexity and context for simply, reality. There is tremendous value in systematically studying actual contexts that present potential tragedies and institutional

arrangements aimed at averting tragedies. Be wary of model-induced myopia, supposed panaceas, and binary thinking. The deep problem with Hardin's tragedy of the commons allegory is not the allegory itself or its translation into a model or even a theory about how people might externalize costs in specific settings. The deep problem is the myopia that the model induced and the binary government-or-market thinking that followed. We consistently make the mistake of thinking in binary terms, individual or social, private or public, market or government. This leads to great distortions in our perceptions about the world and the plans we make. Reality is much more complicated. Standing alone, this lesson may be underwhelming, or perhaps even offensive to the scholar. You might be thinking, "This is not a lesson. We all know that studying reality beats studying fictitious scenarios that do not match reality." Naturally, the next question is how should one go about studying reality? This leads to the second lesson.

Ostrom's Methodological Lesson: Embrace systematic, evolutionary learning through various interdisciplinary methodologies, theories, and empirical approaches, including case studies. There is tremendous value in a research framework that facilitates such learning while itself being subject to adaptation and refinement over time. Ostrom did not presume community based institutions were successful or ubiquitous. Community based institutions required systematic study. To facilitate research on these institutions across diverse resource systems, Ostrom worked for decades on developing a scientific approach to studying and evaluating institutions. She devoted incredible energy to

methodology, bridging disciplines, and enabling systematic, collaborative social science. To systematize research, she developed the Institutional Analysis and Development (IAD) framework. It encourages interdisciplinary research and seeks to avoid path dependencies from

The risk of model-induced myopia that Ostrom identified also provides a strong basis for taking a pluralistic approach to thinking about, and teaching, economics, especially if one cannot go out and study reality as Ostrom did. I discuss the IAD framework as a prominent example, but the reader should understand that Ostrom extended her ideas to the development of a more complex framework for the analysis of Social-Ecological Systems (Ostrom, 2009). Moreover, even when applying the IAD framework, the specific context shaped the research protocols. For example, as reported in Hayes and Ostrom (2005), Ostrom and colleagues associated with the Center for the Study of Institutions, Population, and Environmental Change (CIPEC) and the Workshop in Political Theory and Policy Analysis, both at Indiana University, developed a complex question-based framework tailored for analyzing forests:

Our research team spent two years developing a series of ten protocols, that enable scholars to examine the impact of diverse ways of owning and governing forests (such as individual ownership, joint ownership by a community, etc.). Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013)

Interdisciplinary or methodological blinders, problems akin to the model-induced myopia discussed above. The IAD framework structures a common set of research questions to apply across diverse contexts. Ostrom (2005: 28–29) explained the relationships between a research framework, theories, and models: The development and use of a general framework helps to identify the elements (and the relationships among these elements) that one needs to consider for institutional analysis. Frameworks . . . provide the most general set of variables that should be used to analyze all types of settings relevant for the framework. . . . The development and use of theories enable the analyst to specify which components of a framework are relevant for certain kinds of questions and to make broad working assumptions about these elements. Thus, theories focus on parts of a framework and make specific assumptions that are necessary for an analyst to diagnose a phenomenon, explain its processes, and predict outcomes. . . . Microeconomic theory, game theory, transaction cost theory, social choice theory, public choice, constitutional and covenantal theory, and theories of public goods and common-pool resources are all compatible with the IAD framework (Ostrom, 2006). The development and use of models make precise assumptions about a limited set of parameters and variables. Logic, mathematics, game theory models, experimentation and simulation, and other means are used to explore the consequences of these assumptions systematically on a limited set of outcomes. Multiple models are compatible with most theories. . . . The framework-driven approach is functionalist. It seeks to integrate theoretical and empirical research in coherent manner. Critically, Ostrom did not reject theories or models, but instead embraced the idea that different theories and models could work better for some observed phenomena than for others.

The IAD framework aims to systematize research efforts by facilitating a more rigorous evaluation by matching and testing of theories and models with observed phenomena, and most generally, enable learning over time (Madison, Frischmann and Strandburg, 2010a: 678). It depends heavily on empirical data, and consequently, on a systematic approach to gathering data. The IAD framework identifies the most general set of variables that should be used to analyze all types of settings relevant for the framework and divides the investigation of such variables into groups. The first group is exogenous variables and includes biophysical characteristics, community attributes, and rules-in-use (or governance mechanisms). With respect to the community, and different forms of government ownership) on investment, harvesting, protection, and managing activities and their consequences on forest conditions, including biodiversity (Hayes and Ostrom, 2005: 603–604). She did reject the idea of a one-size-fits-all theory. The following four paragraphs are adapted from Madison, Frischmann and Strandburg (2010a: 678–680). Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013)

Analysis of a particular situation, these attributes of a commons are fixed. In the case of the lobster fishery, for example, these attributes might include the relevant biological characteristics of

lobsters, such as the rates at which they age and reproduce; attributes of the community of fishermen, such as the proximity in which they live to others, the existence of familial relationships, and the skill sets needed for lobster fishing; and the rules explicit or informal that govern fishing. The second group is the action arena, which refers to the social space where participants with diverse preferences interact, exchange goods and services, solve problems, dominate one another, or fight (among the many things that individuals do in action arenas) (Ostrom, 2005: 14). In other words, the action arena is the context in which the exogenous variables combine in particular instances, leading over time to observed patterns of interactions and outcomes.

Ostrom's work emphasizes the diversity of possible combinations of exogenous variables that determine what actually happens in particular instances and, hence, the outcomes that result. The rules governing lobster fishing contribute to the activity's long-term sustainability, for example, but the patterns of interaction actually observed depend on the richness of the particular environment for lobsters, the degree to which rules are actually enforced, seasonal factors such as weather, and interaction with outside influences such as pollution and the state of the larger economy. Understanding the observed success or failure of a commons enterprise such as a lobster fishery may require accounting for all of these factors, even though it may turn out that outcomes are relatively impervious to some of them. The foundation of the framework-driven analysis is structuring questions in clusters about the exogenous variables, the action arena, and the patterns of interactions and outcomes. This approach aims to systematize data gathering across complex, diverse phenomena while remaining amenable to diverse disciplinary perspectives and empirical methodologies. One interesting aspect of the IAD framework is its accommodation of and heavy reliance on case studies. Case studies are an important component to the research program because case studies provide rich, detailed descriptions of institutional arrangements in context. In addition, case studies provide feedback for the research framework itself.

Of course, case studies also slow

To implement the IAD framework, Ostrom and her collaborators employed a three-pronged approach: First, they engaged in a broad range of case studies of natural resource commons to form a basis for a bottom-up practice-based taxonomy of successful and unsuccessful approaches to resource management. Second, they developed a framework, based on the initial case studies, for identifying the variables that are significant in determining the success or failure of a commons enterprise and of the viability of institutions in particular contexts. Third, they preserved flexibility in their framework so that it could be adapted and revised in response to learning derived from the case studies. Based on the information obtained by applying their framework to structured case studies, they developed theories and models for particular commons situations, designed experiments to test those theories, and advanced a set of design principles for successful natural resource commons (Madison, Frischmann and Strandburg, 2010a: 676-677). Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013)

Things down, making the empirical work more laborious, contentious, and incremental. Arguably, this is a virtue. Good (social) scientific research often takes time. A framework-driven approach is particularly attractive for studying the complex interactions between ecological and social (institutional) systems because of the many different

disciplines and methodologies that must be brought to bear if progress is to be made (Ostrom, 2009). Ostrom's embrace of complexity goes further than studying reality and adopting a framework to accommodate different theories and methodologies. She also embraced collaboration among different people, disciplines, and cultures. She worked hard to establish a common ground in the fractured academic world of the natural and social sciences (Becker and Ostrom, 1995: 114). Her work was forcefully interdisciplinary, and throughout her career, she called on various disciplines to remove their disciplinary blinders. In her Presidential Address to the American Political Science Association, for example, Ostrom called for expansion of the type of research methods regularly used in political science and suggested that more understanding is required across the social and biological sciences (Ostrom, 1998). Ostrom recognized that studying commons requires a kind of commons of its own, an interdisciplinary community for sharing skills, knowledge, research, and experience. So she built one.

With an ad hoc group of scholars including political scientists, anthropologists, economists, historians, and natural resource managers she founded the International Association for the Study of the Commons. She was the first President of the IASC. The IASC's three goals are

1. to encourage exchange of knowledge among diverse disciplines, areas, and resource types;
2. to foster mutual exchange of scholarship and practical experience; and
3. to promote appropriate institutional design.

In pursuit of these goals, the IASC hosts major international conferences, publishes *The Commons Digest* and the *International Journal of the Commons*, and engages in many other activities that promote knowledge sharing and build social capital and connections among those concerned with commons.

Ostrom's legacy is most vividly seen in the thousands of people around the world, in many different disciplines and professional settings, who consider themselves a part of the research commons she helped construct.

Actually, she built many. Of particular note, with her husband Vincent Ostrom, also a renowned political scientist, she founded the Workshop in Political Theory and Policy Analysis. The Workshop is an autonomous research center at Indiana University dedicated to the interdisciplinary, collaborative, and comparative study of institutions (see Indiana University Bloomington, 2008). In honor of the couple, IU renamed the workshop, The Vincent and Elinor Ostrom Center for Advanced Studies in Political Theory and Policy Analysis.

The file is too long and its contents have been truncated.

"", "extra": {"cited_message_idx": 10, "search_result_idx": null, "evidence_text": "source"}, "url": "file-mrPVQDMfIU0exlGC6VME4ga"}, {"start_ix": 3990, "end_ix": 4000, "citation_format_type": "tether_og", "metadata": {"type": "file", "name": "Week 1_Beyond the Tragedy of the Commons.pdf", "id": "file-kY5KZqqCLsf87fkcfF02e0Bt", "source": "my_files", "text": "\nContents lists available at ScienceDirect\n\nEnergy Research & Social Science\n\njournal homepage: www.elsevier.com/locate/erss\n\nPerspectives\n\nBeyond the tragedy of the commons: Reframing effective climate change governance\n\nAnthony Patt\nETH Z\u00fcrich, Switzerland\n\nA R T I C L E I N F O\n\nKeywords:\nClimate policy\nTragedy of the commons\nGlobal commons problem\nTechnological transitions\n\nA B S T R A C T\n\nThe tragedy of the commons provides a powerful narrative for a class of environmental problems, and serves to frame them in a way that allows people to identify effective solution strategies. But the problem frame also rests on a set of factual and value-based assumptions, and is inappropriate to guide decision-making

when these assumptions are violated. The climate change mitigation challenge \u2013 reducing greenhouse gas emissions, mainly from the energy sector, to limit global warming to less than 1.5 or 2 \u00b0C \u2013 violates these assumptions. Climate change requires us not to reduce, but to completely prohibit greenhouse gas emissions. Before any such prohibition is feasible, it is first essential to develop a clean energy system that can meet our basic needs. The main barriers to this are not economic, but rather are associated with evolving knowledge, networks, and institutions. Framing climate change in evolutionary terms can help us to appraise policy options more effectively, and ultimately identify those that get us where we need to go.

The tragedy of the commons

The biologist and ethnic nationalist Garrett Hardin wanted society to restrict people's reproductive freedom, and believed that only those parents who would raise their children the right way should be entitled to have babies [1,2]. To support this politically charged belief, Hardin developed an argument based on the idea of the tragedy of the commons, a game theoretic model involving farmers letting their cows graze on the communally owned village green [3]. Every farmer obtains the full benefit of placing an extra cow on the commons to graze, while suffering only a small share of the cost to the community as a whole, in terms of less grass being available to the other cows. Overgrazing is the inevitable equilibrium, unless the community as a whole steps in. Limiting the number of cows, and ideally allocating them to those farmers who can manage them most profitably, is the obvious solution. The lesson transferred well to the point Hardin was trying to make about people in his now famous article.

Today, few would use a tragedy of the commons framing, or related terms such as commons problem, common pool resource problem, or externalities problem, to describe the issue of human population growth. This is largely because the world has witnessed birth rates falling globally, on most continents to below replacement levels, as a result of factors Hardin didn't consider: the education of women, reductions in infant mortality, and urbanization [4,5]. But most analysts do use Hardin's idea to describe other environmental problems, most notably climate change, and based on this framing suggest a strategy similar to what Hardin advocated [6]. The framing may be appropriate for some of these problems, fisheries management being an example that comes to mind. But it is not appropriate for climate change, and the sooner we stop framing climate change in this way, the better.

As a starting point, it is worth considering what the key aspects of a commons problem actually are. Hardin himself described four, and these are as valid today as they were then. First, of course, there needs to be a common pool resource, such as the grass on a village green, or the global carrying capacity for people. Second, there needs to be a use of that resource, or an activity that depletes it, that is legitimate and valuable, accepted by society at large. In Hardin's model, we do want cows to graze on the village green, as long as they do so productively, just as we do want a planet that is home to people. In fact, because the use is so valuable, we want to ensure that it takes place in a manner that is both optimal and sustainable. Third, the common-pool nature of the resource has to be the thing that leads people to overuse or over-deplete the resource, to the point that is clearly suboptimal, perhaps even exceeding its sustainable limits. Fourth, there cannot be a technical solution. By this, Hardin meant that it is not possible to use technology to expand the resource in order to continually accommodate the growing use.

The tragedy of the commons acts a problem frame. The effect of a problem frame is to take a complex issue which affects multiple values and

can be considered from a variety of perspectives and to simplify it around one particular conceptualization, leading to one particular solution strategy [7]. In the case of this framing, it is the third aspect.

<http://dx.doi.org/10.1016/j.erss.2017.05.023> Received 16 May 2017; Accepted 18 May 2017
 E-mail address: anthony.patt@usys.ethz.ch.
 Energy Research & Social Science 34 (2017) 1–13
 Available online 27 May 2017
 2214–6296/ © 2017 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).
<http://www.sciencedirect.com/science/journal/22146296>
<http://www.elsevier.com/locate/erss>
<http://dx.doi.org/10.1016/j.erss.2017.05.023>
<mailto:anthony.patt@usys.ethz.ch>
<https://doi.org/10.1016/j.erss.2017.05.023>
<http://crossmark.crossref.org/dialog/?doi=10.1016/j.erss.2017.05.023&domain=pdf>
 listed in the paragraph above that is crucial. The common-pool ownership structure, meaning that agents do not pay the full cost of their use, is seen as the driving force behind their overuse. Framing a problem as a tragedy of the commons automatically implies that if one could privatize the ownership structure, or make the agents pay the full costs to society of their use of the resource, then an optimal outcome would be achieved. In the case of a village green, the easy solution is to divide it up with fences, and have each subdivided plot belong to a single farmer. In the case of a resource that cannot be subdivided so easily, like the global carrying capacity for humans, then the solution is only slightly more complicated. Either one has to establish a limited number of rights to use the resource, and allocate these to people in advance, or one has to charge people ex post for their use of the resource. An important feature of the model is that the solution increases the resource's overall productivity. And that means that as long as the allocation mechanism or tax is fair, then reaching an agreement to privatize the use rights or internalize their costs should be politically feasible. But the usefulness of such policy guidance depends on the underlying applicability of the problem frame. The presence of a common-pool resource does not guarantee that Hardin's solution strategy is the best; the problem frame ceases to provide useful guidance if any of the other three criteria are violated. A case that illustrates failure on the second of the four criteria is the act of murdering one's neighbor. This depletes the common pool resource of public safety, but murder is not an activity that we want, so we don't solve it by imposing a tax or allocating a limited number of permits. We prohibit it. To illustrate failure on the third criterion, drinking alcohol is a behavior that we tolerate in moderation, and even encourage in some situations, but when people get drunk and start breaking things, they become a public nuisance. Yet we don't believe that internalizing the cost of drunken behavior will get the person on the verge of intoxication to say no to another drink. So we address it by other means, including charging bartenders with cutting people off, and providing treatment programs for alcoholism. To illustrate failure on the fourth criterion, the local public school may be overcrowded, but we can solve this by enlarging the building and hiring more teachers. So we do that, rather than limiting the number of places available or imposing high school fees. Failure on any of these criteria matters. Climate change fails on all three.

2. Why climate change fails the tragedy of the commons criteria

Many people see the 2015 Paris Agreement as representing a turning point in climate governance, but in fact the events that foreshadowed Paris occurred a decade prior to then, culminating in 2007. It was

then that the idea of the 2 °C target gained popularity, based on risk management arguments, and was incorporated into a global action plan agreed to in Bali, Indonesia, at the closing of a failed set of negotiations to extend or replace the Kyoto Protocol [8,10]. Paris built on this decision, and added an additional level of ambition by suggesting the desirability of limiting climate change to 1.5 °C. More importantly, Paris set up a process that could help countries to take the steps to achieve one or the other, in terms of a regular global stocktake, as well as a set of mechanisms to provide financial and capacity-building support to developing countries.

The one thing that the Paris Agreement does not include is a set of negotiated binding national targets, of the kind that are the heart of the Kyoto Protocol. In fact, the failed desire to include such binding targets is what led to the eight-year delay, starting in Bali. And yet this failure should not surprise us, for a simple reason. The tragedy of the commons framing suggests that negotiating binding targets should be politically infeasible, with the main hurdle being the identification of a mutually acceptable allocation rule for the net benefits. But this presupposes that the global target is one that will maximize the value to society of whatever activity it is that degrades the common pool resource. Partial decarbonization as per Kyoto could take place by eliminating inefficiencies in the energy system, and arguably could deliver immediate net economic benefits; negotiating the allocation rule took less than two years. Achieving the Paris targets of 2 °C or 1.5 °C, however, requires that net anthropogenic emissions of greenhouse gases into the atmosphere cease entirely in the second half of this century [11].

Finding immediate net benefits to allocate that are associated with a complete halting of emissions is more or less impossible, and so negotiating such an agreement required convincing people to pay attention to large benefits anticipated in the future, in some cases centuries hence [12,8]. So the temperature target qualitatively changed the character of negotiations, making them far more difficult, arguably impossible. More fundamentally, the need to eliminate emissions entirely, essentially as soon as possible, makes those emissions something that society will no longer tolerate. So climate change fails the second of the four criteria Hardin identified, just like murder.

There has been another major change since about 2007, and that is the recognition that the medium-term costs of eliminating greenhouse gas emissions are likely to be trivial, and may in fact be negative, even before considering the long-term benefits from avoided climate impacts [13,14]. What drove this recognition was the realization from the field of evolutionary economics that policies to expand renewable energy also make them cheaper [15,16]. This fact has become especially salient lately, as the costs of supplying energy from some renewable resources have fallen to below those of fossil fuels [17], especially if one takes into account local environmental effects such as air pollution or water demand [18]. A study in the United States, for example, examined the avoided local and regional environmental impacts associated with installing wind and solar power instead of new coal capacity, and found the value of those impacts to be far larger than the difference in cost between the two technologies [19]. As another example, the costs to own and drive an electric car charged by wind or solar power are approaching parity with those of a conventional gasoline model, at least under some conditions [20].

These trends suggest two additional ways in which the tragedy of the commons framing fails for climate change. First, there is no longer a necessary misalignment of incentives between the emitters of greenhouse gases

and society at large. Every country, with the possible exception of major oil and gas exporters, has reason to mitigate climate change and transform its national energy sector away from fossil fuels, regardless of what other countries may do. Every household will soon have a financial incentive to stop burning oil and gas, regardless of what their neighbors do. So if fossil fuels are still in business, it will not be because of an unjust cost advantage, born from the existence of an externality. Climate change is like the example of public drunkenness: internalizing the cost will not change anything qualitatively. Second, it now appears that a technical solution does exist for climate change. Integrated assessment models suggest that by switching to non-fossil energy sources, we can continue to see global economic activity grow, at roughly the same pace, even as greenhouse gas emissions come to a halt [21]. Climate change is like enlarging the public school.

3. Framing today's challenge in evolutionary terms

But we still have a problem needing to be solved. Using electric cars as an example, a household may soon have a financial incentive to switch over from their gasoline model, but it will not do so unless there is a dense network of charging stations where they want to take long trips. At the same time, there is no business case to install such a network as long as the number of electric cars on the road remains low. This is a chicken and egg problem: you need a chicken to get an egg, but an egg to get a chicken. Similar problems exist across the energy sector. At the most general level, we need to prohibit greenhouse gas emissions, which almost certainly means prohibiting fossil fuels. But which comes first: prohibition, or clean energy? Before prohibition can be politically and socially feasible, we need a clean energy system that

A. Patt Energy Research & Social Science 34 (2017) 133

is good enough to sustain us. Yet given more than a century already spent improving and optimizing an energy system based on fossil fuels, the first steps towards a clean energy system are necessarily expensive, clumsy, and unreliable. Most of the improvements to the clean energy system built around new knowledge, networks, and institutions only come once we start relying on it. Progress can occur, but without policy intervention, it will be slow. It took millions of years to get a chicken when the starting point was a dinosaur. Accelerating evolution is the key challenge for climate policy. Just as the tragedy of the commons framing offered clear guidance in terms of the appropriate policy instruments, so too does an evolutionary framing, based on insights from the emerging scientific study of socio-technical transitions [22]. Our policy instruments need to be those that build the new knowledge, networks, and institutions that will enable a clean energy system to function smoothly and affordably, which is a prerequisite to phasing out fossil fuels. When we think about all of the policies that support renewable energy innovation and deployment state-sponsored R & D, tax credits or feed-in tariffs for project developers, and streamlined permitting processes for green infrastructure that is exactly what is going on. As they create a new system that is viable, these policies lay the groundwork for a second generation of sectoral regulations, already beginning to appear, which prevent new investment into fossil fuel infrastructure. If you frame climate change as an evolutionary problem, it is this sequence of policy instruments that makes the most sense [23].

The issue of how we frame climate change mitigation is important, precisely because the two framings point us in different directions with respect to policy. When there is a true tragedy of the commons, then neo-classical economics and game theory provide a solid basis to favor market-based

instruments, those that allocate limited rights to deplete the resource or internalize the costs of doing so [24]. Confusion can arise, however, because proponents of market-based instruments also suggest that these will provide the needed stimulus for innovation, promoting systemic change [25,26]. But just because these instruments are the best solution to one kind of problem does not mean they are very good or effective with respect to another. In fact, a growing literature shows that they aren't, and that the effective policies to stimulate a transition are those that directly support the development of new knowledge, networks, and institutions, directly addressing the barriers to systemic change [27]. The choice of how we frame climate change dictates the terms by which we evaluate the relative strengths and weaknesses of the different possible solution strategies. Judged by the appropriate criteria, market instruments are generally a poor fit.

The tragedy of the commons framing made sense at a time when we believed that people needed to adjust the energy system at the margins, and believed that the cost of doing so would be high. We no longer believe these things. The atmosphere may be a common pool resource, but using it as a place to put our greenhouse gas emissions is no longer something for which we have any long-term rights to allocate. To prohibit dumping our greenhouse gases there, we first need to accelerate a technological transition towards non-fossil sources of energy, for which the main barriers have to do with knowledge and networks, rather than an inherent difference in cost. Policies providing active and direct governmental support for new technologies and technological systems can change the conditions that hold the new technologies back. In fact they have already done a great deal; they have led to a dramatic decline in the costs of key energy technologies, and contributed to the possibility that global emissions have already peaked. There is still more work to be done, and we can solve climate change if we build on what we have learned. At all costs, we should resist the temptation to reverse course because the policies don't fit one man's convenient story of too many cows on a village green.

Acknowledgment

Funding for the development of the ideas expressed in this article came from European Research Council Starting Grant number 313553.

References

- [1] G. Hardin, The tragedy of the commons, *Science* 162 (3859) (1968) 1243-1248.
- [2] J. Oakes, Garrett Hardin's tragic sense of life, *Sci. Publ. Eye* 40 (4) (2016) 238-247, <http://dx.doi.org/10.1016/j.endeavour.2016.10.007>.
- [3] J. Nash, Equilibrium points in N-person games, *Proc. Natl. Acad. Sci. U. S. A.* 36 (1950) 48-49.
- [4] United Nations Population Division, *World Population Prospects: The 2006 Revision*, United Nations Department of Economic and Social Affairs, 2007, <http://esa.un.org/unpp>.
- [5] W. Lutz, J. Crespo Cuaresma, W. Sanderson, The demography of educational attainment and economic growth, *Science* 319 (2008) 1047-1048.
- [6] R. Stavins, J. Zou, T. Brewer, M. Conte Grand, M. Elzen, M. den Finus, J. Gupta, N. Hoffmann, M. Lee, A. Michaelowa, M. Patterson, K. Ramakrishna, G. Wen, J. Wiener, H. Winkler, *International cooperation: agreements & instruments*, *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, UK and New York, USA, 2014, pp. 1001-1082.
- [7] D. Chong, J. Druckman, Framing theory, *Annu. Rev. Polit. Sci.* 10 (2007) 103-126.
- [8] T. Barker, The economics of avoiding dangerous climate change. An editorial essay on *The Stern Review*, *Clim. Change* 89 (3) (2008) 173.
- [9] K. Hasselmann, T. Barker, *The Stern Review and the IPCC fourth assessment*

report:\n\nimplications for interactions between policymakers and climate experts.

An\neditorial essay, *Clim. Change* 89 (2008) 219\u2013229.\n\n[10] S. Randalls, History of the 2 \u00b0C climate target, *Wiley Interdiscip. Rev. Clim. Change* 1 (4) (2010) 598\u2013605, <http://dx.doi.org/10.1002/wcc.62>.\n\n[11] M. Meinshausen, N. Meinshausen, W. Hare, S.C.B. Raper, K. Frieler, R. Knutti, D.J. Frame, M.R. Allen, Greenhouse-gas emission targets for limiting global warming to 2 \u00b0C, *Nature* 458 (7242) (2009) 1158\u20131162, <http://dx.doi.org/10.1038/nature08017>.\n\n[12] N. Stern, *The Economics of Climate Change*, Cambridge University Press, Cambridge, UK, 2007.\n\n[13] O. Edenhofer, N. Bauer, E. Kriegler, *The impact of technological change on climate protection and welfare: insights from the model MIND*, *Ecol. Econ.* 54 (2\u20133) (2005) 277\u2013292.\n\n[14] IPCC, *Climate Change 2014: Mitigation of Climate Change. Working Group III Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, in: O. Edenhofer, R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eikemeier, B. Kriemann, J. Savolainen, S. Schl\u00f6mer, C. von Stechow, T. Zwickel, J. Minx (Eds.), Cambridge University Press, Cambridge, UK and New York, USA, 2014.\n\n[15] W.B. Arthur, Competing technologies, increasing returns, and lock-in by historical events, *Econ. J.* 99 (1989) 116\u2013131.\n\n[16] L. Argote, D. Epple, Learning curves in manufacturing, *Science* 247 (4945) (1990) 920\u2013924.\n\n[17] B. Obama, The irreversible momentum of clean energy, *Science* 355 (2017) 126\u2013129, <http://dx.doi.org/10.1126/science.aam6284>.\n\n[18] P.G. Bain, T.L. Milfont, Y. Kashima, M. Bilewicz, G. Doron, R.B. Gar\u00f0arsdottir, V.V. Gouveia, Y. Guan, L.-O. Johansson, C. Pasquali, V. Corral-Verdugo, J.I. Aragones, A. Utsugi, C. Demarque, S. Otto, J. Park, M. Soland, L. Steg, R. Gonzalez, N. Lebedeva, O.J. Madsen, C. Wagner, C.S. Akotia, T. Kurz, J.L. Saiz, P.W. Schultz, G. Einarsdottir, N.M. Saviolidis, Co-benefits of addressing climate change can motivate action around the world, *Nat. Clim. Change* 6 (2) (2016) 154\u2013157.\n\n[19] K. Siler-Evans, I.L. Azevedo, M.G. Morgan, J. Apt, Regional variations in the health, environmental, and climate benefits of wind and solar generation, *Proc. Natl. Acad. Sci.* 110 (29) (2013) 11768\u201311773, <http://dx.doi.org/10.1073/pnas.1221978110>.\n\n[20] J. Riesz, C. Sotiriadis, D. Ambach, S. Donovan, Quantifying the costs of a rapid transition to electric vehicles, *Appl. Energy* 180 (2016) 287\u2013300, <http://dx.doi.org/10.1016/j.apenergy.2016.07.131>.\n\n[21] L. Clark, K. Jiang, K. Akimoto, M. Babiker, G. Blanford, K. Fischer-Vanden, J.-C. Hourcade, V. Krey, E. Kriegler, A. L\u00f6schel, D. McCollum, S. Paltsev, S. Rose, P.R. Shukla, M. Tavoni, B.C.C. van der Zwaan, D.P. van Vuuren, Assessing transformation pathways, *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, UK and New York, USA, 2014, pp. 413\u2013510.\n\n[22] F. Geels, Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study, *Res. Policy* 31 (2002) 1257\u20131274.\n\n[23] A. Patt, *Transforming Energy: Solving Climate Change with Technology Policy*, Cambridge University Press, New York, 2015.\n\n[24] P. Portney, R. Stavins, *Public Policies for Environmental Protection, Resources for the Future*, Washington, 2000.\n\n[25] R. Naam, *The Infinite Resource: The Power of Ideas on a Finite Planet*, University Press of New England, Lebanon, NH, 2013.\n\n[26] E. Somanathan, T. Sterner, T. Sugiyama, D. Chimanikire, N.K. Dubash, J. Essandoh-Yeddu, S. Fifita, L. Goulder, A. Jaffe, X. Labandeira, S. Managi, C. Mitchell, J.P. Montero, F. Teng, T. Zylicz, National and sub-national policies and institutions, *Climate Change 2014: Mitigation of Climate*

Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK and New York, USA, 2014, pp. 1141-1205. [27] M. Grubb, Planetary Economics: Energy, Climate Change and the Three Domains of Sustainable Development, Earthscan, London, 2014. A. Patt Energy Research & Social Science 34 (2017) 1-33. [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0005](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0005) <http://dx.doi.org/10.1016/j.endeavour.2016.10.007> [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0015](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0015) [http://esa.un.org/unpp](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0015) <http://esa.un.org/unpp> [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0025](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0025) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0030](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0030) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0035](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0035) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0040](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0040) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0040](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0040) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0045](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0045) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0045](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0045) <http://dx.doi.org/10.1002/wcc.62> <http://dx.doi.org/10.1038/nature08017> [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0060](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0060) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0060](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0060) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0065](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0065) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0065](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0065) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0070](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0070](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0070](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0070](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0070](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0070) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0075](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0075) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0075](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0075) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0080](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0080) [http://dx.doi.org/10.1126/science.aam6284](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0080) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0090](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0090](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0090](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0090](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090) [http://refhub.elsevier.com/S2214-6296\(17\)30143-3/sbref0090](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0090) <http://dx.doi.org/10.1073/pnas.1221978110> <http://dx.doi.org/10.1016/j.apenergy.2016.07.131> [http://refhub.elsevier.com/S2214-](http://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105)

6296(17)30143-3/sbref0105\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0105\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0110\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0110\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0115\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0115\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0120\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0120\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0125\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0125\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0130\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0135\nhttp://refhub.elsevier.com/S2214-6296(17)30143-3/sbref0135\n\n\n\tBeyond the tragedy of the commons: Reframing effective climate change governance\n\n\tThe tragedy of the commons\n\n\tWhy climate change fails the tragedy of the commons criteria\n\n\tFraming challenge in evolutionary terms\n\n\tAcknowledgment\n\n\tReferences\n\n\n\n\n\n", "extra": {"cited_message_idx": 9, "search_result_idx": null, "evidence_text": "source"}, "url": "file-kY5KZqqCLsf87fkcfFO2e0Bt"}]], "gizmo_id": null, "is_complete": true, "message_type": null, "model_slug": "gpt-4", "default_model_slug": "gpt-4", "pad": "AAAAAAAAAAAAAAAAAAAAAAAAAAAA", "parent_id": "462c8935-33ef-4e97-9efd-e2dbd789c534", "request_id": "87elc715391a83b5-MXP", "timestamp_": "absolute", "content_references": [{"matched_text": "\u3010\u2020source\u3011", "start_idx": 1502, "end_idx": 1513, "alt": null, "type": "file", "name": "Week 1_Two Enduring Lessons from Elinor Ostrom.pdf", "id": "file-mrPVQDMfIU0exlGC6VME4ga", "source": "my_files", "snippet": "\nElectronic copy available at: http://ssrn.com/abstract=2252133Electronic copy available at: http://ssrn.com/abstract=2252133\n\n\n\n\n\n\n\n\n\nBenjamin N. Cardozo School of Law \u00b7 Yeshiva University \nJacob Burns Institute for Advanced Legal Studies \n\nMarch, 2013 \nFaculty Research Paper No. 387 \n\n\n\n\n\n\n\n\n\nTwo Enduring Lessons \nfrom Elinor Ostrom \n\n\n\nJournal of Institutional Economics (forthcoming 2013) \n\n\n\n\n\n\n\n\n\nBrett M. Frischmann \nProfessor of Law & Director, Cardozo Intellectual \n\n\nProperty and Information Law Program \nBenjamin N. Cardozo School of Law \n\n\n55 Fifth Avenue, Room 1004 \nNew York, NY 10003 \n\n\n(212) 790-0859 (phone) \n\nfrischma@yu.edu \n\n\n\n\n\n\n\nElectronic copy available at: https://ssrn.com/abstract=2252133\n\n\n\n\n\n\n\nElectronic copy available at: http://ssrn.com/abstract=2252133Electronic copy available at: http://ssrn.com/abstract=2252133\n\n\n\nJournal of Institutional Economics (forthcoming 2013) \n\n\n\n\n\n1 \n\n\n\n\n\nTwo Enduring Lessons from Elinor Ostrom \n\n\nBrett M. Frischmann\n1\n\n\n\n\nBenjamin N. Cardozo School of Law \n\n\nYeshiva University \n\n\nNew York, NY \n\n\nfrischma@yu.edu \n\n\n\n\n\n\n\nAbstract: \n\n\n\n\n\nThis article is a tribute to

Elinor Ostrom. It explores two enduring lessons she taught: a substantive lesson that involves embracing complexity and context, and a methodological lesson that involves embracing a framework-driven approach to systematic, evolutionary learning through various interdisciplinary methodologies, theories, and empirical approaches.

First, I discuss Ostrom's work on environmental commons. I illustrate the two lessons through a discussion of the tragedy of the commons. Next, I explain how the two lessons play a significant role in recent efforts to extend Ostrom's work on environmental commons to knowledge/cultural commons. I draw a parallel between the tragedy of the commons allegory and the free rider allegory, and show how many of the problems Ostrom explored in the environmental context are manifest in the cultural environmental context. I discuss an ongoing research project that follows the path that Ostrom blazed and systematically studies commons in the cultural environment.

Elinor Ostrom taught many lessons, as an amazing mentor, teacher, scholar, and human being. She had a profound influence on me, and I am honored to offer this tribute to her. Like many others, I was inspired by Ostrom's design principles for natural resource commons and the demonstrated feasibility of community-based management for shared resources, and I tried to follow her lead. In fact, my first academic talk was about lessons from the literature on environmental commons that map to the study of other types of resource commons, such as information and Internet commons. I will return to the theme of that talk here. I will not discuss her theoretical or empirical contributions as such; many others have done so and will continue to do so, and for good reason. Instead, I will discuss two enduring lessons Ostrom taught about social science research.

The two lessons can be summarized as follows:

The author wishes to thank the editor-in-chief, two anonymous referees, Michael Burstein, Daniel Cole, Michael Madison, Al Roundtree, Charles Schweik, Alex Stein, and Katherine Strandburg for their constructive comments and suggestions. The usual disclaimer applies.

Throughout this article, I refer to contributions made by Ostrom and do not list all of her many collaborators or people who also made related contributions. But I want to be clear that she collaborated with many others and she readily acknowledged the independent contributions of many others working on similar issues.

Electronic copy available at:
<https://ssrn.com/abstract=2252133>

Journal of Institutional Economics
(forthcoming 2013)

Substantive Lesson: Embrace complexity and context or simply, reality; avoid distorting reductionism and overstated gains from simple models.

Methodological Lesson: Embrace systematic, evolutionary learning through various interdisciplinary methodologies, theories, and empirical approaches, including case studies; be aware of, and try to avoid, path dependencies from disciplinary or methodological blinders.

The first lesson leads to the second. Anyone can say that one should embrace complexity and study reality, and many people do. What makes Elinor Ostrom incredibly special is that she worked tirelessly to develop a robust framework for doing it, and she did it, time and again, and in a collaborative way that built an international interdisciplinary community.

In Part I, I discuss Ostrom's work on environmental commons. I illustrate the two lessons in the environmental context with a discussion of the tragedy of the commons. Ostrom's theoretical and empirical contributions probably are best recognized in the environmental context. Her contributions extend much further, as the Nobel Prize Committee recognized

when it awarded her the 2009 prize along with Oliver Williamson. Still, there is plenty of work to be done in exploring and extending her contributions in other contexts. In Part II, I focus on that exploration and explain how the two lessons play a significant role in recent efforts to extend Ostrom's work on environmental commons to knowledge/cultural commons. I draw a parallel between the tragedy of the commons allegory and the free rider allegory, and then show how many of the problems Ostrom identified and explored in the environmental context are manifest in the cultural environmental context. I briefly discuss an ongoing research project that aims to follow the path that Ostrom blazed and systematically study commons in the cultural environment. I. Two Lessons from Ostrom's Work on Environmental Commons Elinor Ostrom's pioneering work challenged the notion that rational human beings would be helplessly trapped in social dilemmas. Much of her work focused on environmental commons and confronted the then-dominant and still powerful concept of the tragedy of the commons. The term commons would generally conjures up the notion of a shared community resource, such as a public park or a common pasture. The term gained considerable notoriety among economists, political scientists, and other social scientists after the publication of Garrett Hardin's essay *The Tragedy of the Commons* in *Science* (1968). Hardin (1968: 1244) described the tragedy of the commons as follows: Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013) What is the utility to me of adding one more animal to my herd? This utility has one negative and one positive component. 1) The positive component is a function of the increment of one animal. Since the herdsman receives all the proceeds from the sale of the additional animal, the positive utility is nearly +1. 2) The negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all the herdsmen, the negative utility for any particular decision-making herdsman is only a fraction of -1. Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another; and another.... But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all. 3) Hardin's formulation has been the subject of extensive analysis and critique. At its core, the tragedy of the commons allegory illustrates a standard externality problem each individual rationally maximizes his or her private welfare without accounting for external costs, i.e., the costs imposed on others. 4) Avoiding tragedy seems to require collective action to manage use of the shared resource. Simply put, unconstrained consumption is not sustainable, and thus, constraints must be introduced if the resource is to be sustained. What should the constraints consist of? Hardin recognized two (top-down) solutions: government regulation and privatization. Government can constrain consumption by directly managing or regulating use of the

shared resource. Alternatively, government can establish a system of private property rights delineating ownership of the resource. The former presumes that the government will take into account the aggregate effects and manage use of the resource efficiently over time, and the latter presumes that well-defined private property rights will facilitate market exchanges and lead to an efficient allocation of access and use rights, and consequently, efficient management of the resource over time (Demsetz, 1967). Both approaches eliminate the commons; no longer do commoners freely choose for themselves how to manage a shared resource, for such freedom, Hardin claims, brings ruin to all. Both approaches rely on collective action through government to introduce constraints. The approaches differ substantially in terms of the manner in which ongoing (month-to-month, day-to-day, minute-to-minute) resource allocation decisions are made.

I include the block quote because it is useful to see what Hardin actually said. Paraphrasing Hardin often leads to adjustments that obscure or improve Hardin's simple story. In Coasian terms, it is a joint cost problem (Coase, 1960). Electronic copy available at:

<https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013)

The tragedy of the commons allegory became the starting point for examining common pool resource problems and solutions. Many analysts assumed the tragedy of the commons model described a normal problem (at least for common pool resources) and a binary solution set followed: To avoid tragedy, society must turn to government command-and-control (micro-management) or private property-enabled markets. Economists, political scientists, and many others analyzed and debated how well these two types of regulatory solutions work. Will command-and-control regulation by government lead to efficient outcomes or would society be better off relying on private ordering by markets? Elinor Ostrom challenged the entire enterprise at its roots by asking two foundational sets of questions: First, how well does the tragedy of the commons allegory describe reality? Is it a useful theory for making predictions about real-world behavior of individuals sharing common pool resources? Does it describe a normal or exceptional situation? Does it provide a useful basis for choosing or designing regulatory solutions? Second, does the binary choice between government command-and-control regulation and private property-enabled markets reflect the full range of options? Are there alternative (bottom-up) institutions and/or means for collective action? Critically, the two sets of questions are related, particularly when one begins with the tragedy of the commons allegory. Hardin blurred resource system with resource management. In his allegory, the shared resource system is the pasture, and open access sharing among herders is the resource management or governance regime. As did many social scientists, Hardin made a series of assumptions with respect to both resource and resource management that limit the generalizability of his allegory. As Ostrom (2007: 15183) explained: Hardin envisioned a pasture open to all in which each herder received a direct benefit from adding animals to graze on the pasture and suffered only delayed costs from overgrazing. Translating his metaphor into a theory requires five assumptions: (i) the resource system is a pasture; (ii) no governance system is present related to the resource system; (iii) the mobile individual resource units (the animals grazing on the pasture) can be identified and are the property of their owners and, when fattened, can be sold for cash; (iv) a sufficient number of users, given the size of the pasture, are using the pasture

to adversely affect its long-term productivity; and (v) the resource users independently make decisions to maximize their own short-term returns. These five assumptions lead to a theoretical prediction of very high harvesting of the pasture grasses and severe overharvesting or destruction of the ecological system. Electronic copy available at: <https://ssrn.com/abstract=2252133> Journal of Institutional Economics (forthcoming 2013) Situations characterized by these assumptions, in which individuals independently make anonymous decisions and primarily focus on their own immediate payoffs, do tend to overharvest open-access resources. Researchers have repeatedly generated a tragedy of the commons in experimental laboratories when subjects make independent and anonymous decisions in a common-pool resource setting. Making one small change in the structure of laboratory experiments, a change that is predicted by game theory to make no difference in the predicted outcome, has repeatedly had major impacts on interactions and outcomes. Simply enabling subjects to engage in face-to-face communication between decision rounds enables them to approach socially optimal harvesting levels rather than severely overharvesting the commons. In the face-to-face discussions, participants tend to discuss what they all should do and build norms to encourage conformance.⁵ Note that when the assumptions hold and fully describe the resource setting, the theory's predictions may be useful. But this is exceptional. Reality is considerably more complex. The tragedy of the commons allegory rarely describes shared resource settings in a sufficiently complete manner as to qualify as a useful theory for making predictions or prescribing regulatory solutions. More is needed. Of course, it may be convenient to work within the confines of the allegory or model and perhaps to assume that reality conforms to those confines because doing so makes analysis tractable and leads to a well-defined problem and possible solutions to compare and evaluate. But this is a fundamental mistake and an example of distorting reductionism. It can lead the analyst to miss what is most important and focus on what is least relevant. As Ostrom (2007) explained in the quote above, a slight change, which takes you outside the confines of the model, gives rise to solutions that completely escaped attention and would not be predicted to be relevant. Relaxing one of the assumptions, or just recognizing that some other factor is relevant to the situation, can change everything; cooperation to avoid tragedy becomes theoretically feasible without resort to one of the two solutions. As is now well understood in the field of institutional economics generally, community management, social norms, and other

Ostrom (2000) also critiqued reliance on the rational actor model when analyzing collective action and social dilemmas. After establishing a series of well-substantiated facts about human behavior based on extensive fieldwork: I believe that one is forced by these well-substantiated facts to adopt a more eclectic (and classical) view of human behavior (Ostrom, 2000: 141). She developed a second-generation model of rationality in which humans are complex, fallible learners who seek to do as well as they can given the constraints that they face and who are able to learn heuristics, norms, rules, and how to craft rules to improve achieved outcomes (Ostrom, 1998: 9). The second-generation model of rationality predicts that reciprocity, reputation, and trust as core relationships can lead to increased net benefits (Ostrom, 1998: 13). This theoretical model identifies individual attributes that