The Future of Common-Pool Resource Management

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Executive Summary

The urgency of planning and implementing sustainable environmental practices cannot be understated. Most recently, world leaders spoke of the the pressing need to deal with climate change at COP21, with many heralding the talks as a sign that the international community was finally moving from the realm of words to that of action. However, problems continue to abound as governments grapple with the imperative of ensuring their countries' growth and development versus that of implementing environmental policies – there remains difficulty in bridging the gap between policy and reality.

Since their inception, top-down environmental management solutions have come under fire for their inefficacy and ultimate inability to reverse and stop the depletion of Earth's resources. As a result, there has been an increased interest in finding and implementing local-level solutions to global issues. At the same time, such community-based solutions, while effective at raising awareness of particular issues, have been criticized for lack of follow-through, and for their ultimate inability to do more than identify problems with the status quo.

This paper aims to discern the different benefits of local versus top-down methods of common-pool resource (CPR) management, in the context of resource scarcity in the world today. Contrasting these two ideal types, it identifies existing local and top-down solutions to the management of the common-pool resources of land, energy, and fisheries, and evaluates a variety of relevant historical and current case studies for their successes and failures.

The paper employs a comparative methodology in order to highlight the ways in which state regulation of environmental resources can learn from community-based initiatives. It also attempts to bring in different perspectives that have dominated the debate, such as those rooted in ecofeminist and social psychological analysis. The paper concludes with the assertion that different strategies of CPR management and coordination are appropriate for different settings. In terms of general and specific recommendations for CPR management, it argues for:

- 'Simultaneous' ownership, that is, collaboration between government and community bodies and institutions, of certain CPRs;
- The empowerment of local communities in taking ownership and responsibility for collaborative CPR projects;
- The extension of national management strategies for deep sea fishing in particular; and
- The importance of tailoring solutions for CPR management based on the nature of the CPRs themselves, and the contexts in which they are shared.

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I. Introduction

I.1 The Problem

This paper aims to discern the different benefits of local versus top-down methods of common-pool resource management, in the context of resource scarcity in the world today. In order to frame this discussion, a few preliminary definitions are required.

"Common-pool resources" refers to those resources that are (i) non-exclusive, that is, it is difficult to regulate access to the resource, and (ii) that fulfil what has been referred to as "subtractability", that is, that each user has the ability to subtract from the welfare of the others. These two factors are often responsible for the so-called "tragedy of the commons", which refers to the situation in which rational actions, undertaken by the individual users of resources held in common, often yield consequences which, from the perspective of their collective welfare, are entirely irrational. This is often illustrated (first by Garrett Hardin, 1968, *Science*) with the example of a pasture, or common, which is "open to all", and where each herder is entitled to graze her animals. In the absence of any authority instructing him otherwise or agreements between the herders to the contrary, each individual herder, acting out of rational self-interest, will extract as much benefit from the land as she can, and therefore graze her animals as often as possible. She would also have an incentive to increase the number of animals she grazes on the common, since she receives an immediate benefit from doing so, and only has a share in the costs of overexploitation.[1] Through her action, and that of her fellow herders, the land will inconsequence become severely depleted. The costs of leaving the land to recover would be immediate, while the costs of not doing so would be delayed. The rational herder will therefore, acting independently out of self-interest, through collective action damage the commons and the welfare of himself and the other users.

"The commons" is therefore a general term referring to common-pool resources in which stakeholders each have equal interest; this includes the global commons, which are resource domains defined in international law as the High Seas,

[1]Ostrom, Elinor. *Governing the Commons: The Evolution of Institutions for Collective Action.* Cambridge: Cambridge University Press, 1991.

the Atmosphere, Antarctica, and Outer Space.[2] This paper is specifically interested in the common resources of energy and land, and seeks to provide recommendations for how to avoid a tragedy of these commons.

"Local solutions" are hereby defined as initiatives planned and implemented by small communities in response to locally-identified problems. In contrast to top-down initiatives, local solutions are seen as orchestrated by individuals rather than large governments, corporations, or other such bureaucratic entities; they are therefore often deemed to be more familiar with, and more responsive to, the needs of specific communities. On the other hand, local solutions are often criticized as being unsustainable due to a lack of centralized organization, as well as funding; top-down solutions, usually having the backing of large organizations, are often seen to be more feasible in the long-run, if sometimes alienating and plagued by the pathologies of large organizations.[3]

Some theorists have emphasized that to separate bottom-up solutions from top-down solutions is to construct a false dichotomy between social mechanisms that are in fact are more similar than not.[4] This paper, however, has employed these two ideal types in order to highlight the lessons that can be learned from their respective implementations – the feature we are concerned with is who, or which organizations, is in charge of a particular solution's organization and implementation, rather than the specific details of particular cases. The paper acknowledges that the differences between these two types of solutions are rarely as clear-cut as one would imagine, but at the same time that each type is unique and contributes to the issue of CPR management in different ways.

[2] UNEP. "DELC Division of Environmental Law and Conventions." *United Nations Environment Programme.* 2016. Available at: http://www.unep.org/delc/ [Accessed 19.09.2016].
[3] Barnett, M. N. and Finnemore, M. (1999) "The Politics, Power, and Pathologies of International Organizations." *International Organization* 53.4: 699-732. Available at: https://www.jstor.org/stable/2601307 [Accessed 19.09.2016].
[4] Hayashi, S. "Nassim Taleb's False Dichotomy of Top-Down and Bottom-Up Approaches to Farming With Respect to GMOs." *Nodes of Science.* 2015. Available at: https://nodesci.net/blog/2015/09/16/nassim-talebs-false-dichotomy-of-top-down-and-bottom-up-approaches-to-farming-with-respect-to-gmos/ [Accessed 19.09.2016].

I.2 Collective Needs, Public Goods and Common-Pool Resources: The Cooperation Imperative

A policy's influence is evaluated based on its impact on societal collective needs.[5] The two primary types of collective needs are common-pool resources (CPRs) and public goods. These two collective needs share two characteristics. The first one is that all members of a group must contribute to their formation and preservation, the second is that all members of a group can make use of the collective goods. Collective needs that are publicly shared are an attribute of all societies, regardless of their stage of development.[6] Certain collective needs can be vital for survival (e.g., a source of clean drinking water), while sometimes they are enjoyable (e.g., public entertainment).[7] Land, energy, public works and public broadcasting are all examples of public goods. One could argue that the constant functioning of a society is largely dependent on certain publicly shared collective needs.

The realisation of public goods is in part or in whole dependent on the donations of individuals' capital (e.g., voluntary work, money). Gathering capital permits the existence and maintenance of public goods provision. However, the reality that public goods require an individual's short term loss of income in order to allow for a long-term societal gain creates a prisoner's dilemma. This is because in any given situation, an individual will achieve a better outcome by behaving selfishly and not contributing their capital – it is possible for an individual to benefit from the maximization of the public good, even if they themselves do not contribute to this public good, as a 'free-rider'. Additionally, if the actualisation of the public good is suboptimal, selfish individuals that did not contribute to this good will not suffer the consequences.

Discrete public goods require a minimal accumulation of capital to be realised while continuous public goods can be provided in various amounts depending on the amount of contributed capital. Hence, in the case of discrete public goods, not giving and failing to provide a public good is a worse outcome than giving and receiving the

[5] Nakamura, R. T. (1987). "The textbook policy process and implementation research." *Review of Policy Research*, 7(1), 142-154. Available at: http://onlinelibrary.wiley.com/doi/10.1111/j.1541-1338.1987.tb00034.x/abstract [Accessed 25.09.2016].
[6] Boyd, R., & Silk, J. B. (2012). *How humans evolved*. (New York: WW Norton & Company.)
[7] Parks, C. D., Joireman, J., & Van Lange, P. A. M. (2013). "Cooperation, trust, and antagonism how public goods are promoted". *Psychological Science in the Public Interest,* 14(3), 119-165. Available at: http://psi.sagepub.com/content/14/3/119.full.pdf+html?ijkey=sxINFqBnPD59Y&keytype=ref&siteid=sppsi [Accessed 25.09.2016].

good, as it will lead more and more individuals to pursue their selfish aims to the detriment of the wider society. This is an important factor when arguing for the pros of donating to public good realisation.

Common-pool resources are a type of collective need that are the opposite of public goods. This paper in particular focuses on CPRs and their management, either by governments or local communities, or both. CPRs begin with full provision. Individuals either have restricted or unlimited free access to sample a common-pool resource. Continuously consumed common-pool resources will reduce over time and may or may not be replenished. Petroleum is an example of a non-replenishable common-pool resource. On the other hand, water is an example of a common-pool resource that can be partially replenished. Individuals will experience a short-term gain, with the chance of suffering a long-term loss if the resource is exhausted. On the individual level, there is a conflict between acting selfishly or acting for the good of the group. In order for a resource to not be exhausted, it is required that individuals take smaller amounts of a common-pool resource so that the replenishment rate can be at balance with the consumption rate. In this case, the replenished resource will nearly or completely replace the taken amount, which makes resources last longer. On the other hand, certain resources can spoil, which implies that certain resources can be underused. Many resources if unused, within a certain interval, will be spoiled. Hence, determining the conventional rate of consumption is difficult because it requires taking into account the speed at which a resource can replenish or spoil. Instant benefits are assured when individuals use common-pool resources. However, unlike public goods, common-pool resources decline over a relatively long time interval.[8]

The main issue with policies that promote common-pool resource management is that there is a conflict between what is best for the group and what is best for certain individuals.[9] If the argument is that policies which provide collective needs to a population are desirable, one should consider how a society's engagement with such policies can be promoted. Moreover, who should decide what is desirable for a population, and how does that translate in terms of implementation? This is the key consideration when it comes to deciding on appropriate CPR management techniques.

Eek and Biel (2003) suggest that individuals typically expect all other group members to be involved with the continuous provision of a common-pool resource, while simultaneously believing they should only be involved insofar as they are given the flexibility to be as selfish (or unselfish) as they want.[10] The Greed, Efficiency and

[8] Ibid.
[9] Ibid.
[10] Eek, D., & Biel, A. (2003). "The interplay between greed, efficiency, and fairness in public-goods dilemmas." *Social Justice Research*, 16(3), 195-215. Available at: http://link.springer.com/article/10.1023/A:1025984611796 [Accessed 25.09.2016].

Fairness (GEF) hypothesis proposes that individuals are greedy, but that their greed is restricted by their desire to consume resources efficiently and achieve fairness by doing so[11]. Hence the hypothesis implies equal resources for all group members. The GEF hypothesis was later generalised by Eek & Biel to collective need dilemmas. They conducted studies where individuals' decisions were either highlighted or not and the outcome of social dilemma tasks were framed collectively or individually. The experimental control influenced cooperation rates. The influence of greed, efficiency and fairness on decisions varied due to the experimental manipulation. The results suggest that the perceived fairness of how a resource is allocated influences individual cooperation rates. Therefore, policy that is informed about the psychological research on human cooperative choice and antagonism can better attempt to satisfy the needs of the individual and the collective[12]. Such research more importantly demonstrates that when it comes to making decisions about resource consumption, individuals are affected by their proximate communities – the question of whether cooperation is best orchestrated from above or from below is what this paper will try to unpack. The framework of social psychology is unique in this respect in allowing us to understand the motivations between community actors in CPR management, and moreover how these actors may be incentivized to participate in this management.

A cooperative choice, in the context of consumption, would imply that individuals behave in a way that is good for the in-group. The opposite of cooperative choice is antagonism, which implies behaviour that is beneficial to the individual that is behaving. Cooperative and antagonistic behaviour leads to a large range of decisions made by individuals. Individuals have a strong motivation to behave non-cooperatively.[13] Good policy will aim to promote cooperative behaviours that will lead to the establishment and maintenance of a conventional rate of consumption and the sustainable societal usage of common-pool resources. Policies can promote cooperative behaviours by framing them as behaviours that are beneficial to both the individual (because they get their share of the common-pool resources) and the group (because the sustainable use of common-pool resources allows for continuous provisioning to group members).

Antagonistic or selfish behaviour occurs when individuals behave in a way that boosts their immediate self-interest. It occurs regularly in contexts that require cooperation, such as the context of common-pool resource consumption. The

[11] Wilke, H. A. (1991). "Greed, efficiency and fairness in resource management situations". *European review of social psychology*, 2(1), 165-187. Available at: http://www.tandfonline.com/doi/abs/10.1080/14792779143000051 [Accessed 26.09.2016].
[12] Parks, C. D., Joireman, J., and Van Lange, P.A.M. "Cooperation, trust, and antagonism: how public goods are promoted."
[13] Ibid.

antagonistic behaviour of one or more individuals can prevent efficient cooperation towards the achievement of a collective endeavour. It must be noted that the selfish person would like for a common-pool resource to be available in order to receive its benefits. However, the selfish individual will not maintain a conventional rate of consumption. Hence exploring the context of cooperative and antagonistic behaviour is essential.[14] Individuals often selfishly use land and energy, which leads to the unbalanced provision of these common-pool resources. The key is in identifying whether governments or local communities can best secure cooperation – or whether it is the combination of both that is key.

[14] Ibid.

I.3 Theoretical Approaches

Many theoretical perspectives shed light on the desirability and rationality of various forms of CPR management. This section will focus on Political Realism, as well as the debates within it, and Postcolonial Ecofeminism, as lenses with which to analyze this topic. Realism, a broad political theory based on the assertion that individuals and groups are primarily motivated by self-interest and the desire to extend their power, provides a crucial lens through which we can understand the difficulty of CPR management. Its pervasiveness in discourses of CPR management is evidenced by the ways in which the tragedy of the commons is continually used to justify increasing state intervention in resource management, given the assumed difficulty of ensuring cooperation between individuals in a situation of scarcity where the rational option is to maximize one's own profit. However, as we will illustrate, the generality of Realist principles has given rise to the phenomenon of diametrically opposed concepts, namely the tragedy of the commons and the counter-argument that privatization as a means of protecting the commons is self-defeating, being rooted in the same Realist thought.

The second theory, Postcolonial Ecofeminism, situates itself at the intersection of postcolonialism, environmental issues, and feminism. Because it is founded on the empirical claim that "the exploitation of nature and the oppression of women are intimately bound up with notions of class, caste, race, colonialism and neocolonialism"[15], an ecofeminist lens can help us illuminate the ways in which current CPR management methods fall short of appreciating the postcolonial context in which they operate and the impact of the subjugation of women that is often taken for granted. Moreover, the ways in which ecofeminism emphasizes grassroots organization as a remedy to existing inequalities may prove illuminating in the exploration of the potential of community-based initiatives in the coordination and management of common pool resources.

Political Realism

Privatisation (Hardin) vs. Public ownership (Ovetz)

A major debate within Realist thought on how 'the commons' should be governed is that between Garrett Hardin and Robert Ovetz, the former supporting privatisation of the commons as the best means to manage them and the latter disagreeing. Hardin's concept of 'the tragedy of the commons', that the public sharing of common-pool resources is doomed to fail, is based on the Realist understanding of

[15] Kaur, G. (2012). "An Exegesis of Postcolonial Ecofeminism in Contemporary Literature". *GSTF International Journal of Law and Social Sciences (JLSS),* 2(1). Available at: http://www.ipedr.com/vol44/007-ICSHH2012-W00008.pdf. [Accessed 25.09.2016].

the self-serving nature of humanity. Using the analogy of an open pasture on which a group of herdsmen are allowed to keep their cattle, Hardin first analogised in an essay in 1968 that any rational herdsman would seek to expand their herds so as to increase their utility but in doing so, the pasture would quickly become exhausted. Thus, Hardin concluded that in such a situation:

> "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."[16]

In Hardin's view, therefore, the ethics of sharing is fundamentally flawed because each person's primary self-interest compromises the interest of the whole. Instead, he argued that a system of private property would better safeguard the commons as under such a system those "who own property recognise their responsibility to care for it".[17] This "responsibility", understood as the external costs associated with communal ownership that would now be internalized by the owner, such as degradation and reduction of the CPR, would spur owners to utilize the commons more efficiently in order to maintain its long term value.

However, Ovetz attempts to turn Hardin's logic on its head by arguing that "the privatization of the commons is the real tragedy" because it "encourages people to exploit and own more and more of the commons while leaving the human community to shoulder the burden of their rapid depletion".[18] To borrow Hardin's analogy, the theoretical benefits of privatisation would be undermined by the lack of contentment with one's portion of the pasture and the insatiability of desire to possess more land and increase productivity, thus leading to the same outcome: the over-exploitation of the commons. In Ovetz's view, privatisation is the cause of the environmentally damaging methods that corporations and countries have adopted to manage their CPR allotment. For example, he blames the trading of fishing quotas for overfishing and describes the greenhouse gas emissions trading mechanism of the Kyoto Protocol as "the selling of quotas to polluters to continue polluting our atmosphere and wreaking havoc on our climate"[19]. Thus, in contrast to Hardin's encouragement of privatisation

[16] Hardin, G. (1968). "The Tragedy of the Commons." *Science*. Vol. 162, Issue 3859, pp. 1243-1248. Available at: https://liublc.files.wordpress.com/2012/03/tragedy-of-the-commons.pdf [Accessed 25.09.2016].
[17] Hardin, G. (1974), "Living on a Lifeboat." *Garrett Hardin Society.* Available at: http://www.garretthardinsociety.org/articles/art_living_on_a_lifeboat.html [Accessed 25.09.2016].
[18] Ovetz, R.. "Privatization is the Real Tragedy of the Commons". *ENN.* 2005. Available at: http://www.enn.com/top_stories/article/9010 [Accessed 25.09.2016].
[19] Ibid.

in order to align self-interest with the wider need to protect the commons, Ovetz argues that Hardin's suggestion is counter-intuitive due to the ever-present desire for more and the self-defeating strategies that limitations on CPR use inherently encourages.

However, this debate does not neatly parallel the question of whether local or top-down solutions to CPR management are better, i.e. it is not necessarily the case that Hardin's argument supports local solutions while Ovetz's argument supports top-down solutions. Rather, the question of whether local solutions are the 'future', i.e. more efficient and able to avoid the tragedy of the commons *as well as* the problems caused by privatisation, demands a clear definition of what makes a solution fundamentally 'local' or 'top-down': scale, the weightage of accountability held to the state or of the community group, level of detail either group has about the project, the amount social and environmental responsibility involved, and the presence of intermediating political concerns are some major factors that are implicated in establishing such definitions. Moreover, the distinction between 'local' and 'top-down' must address whether those involved in 'local' implementation strategies truly are more personally invested in protecting the commons, or at least more so than the state would be. If they are, this would suggest that efforts by the state to protect the commons are disinterested and disingenuous, and instead geared towards commodifying the commons to make them conveniently tradable assets, as Ovetz suggests in his perceptions of the Kyoto Protocol and of the fishing industry.

Ultimately, political realism can be seen to contribute in the first instance a criterion for typifying top-down vs. local solutions, and in the second a critical perspective on "local" solutions, to our understanding and analysis. These issues will be explored in subsequent sections through a series of real-life examples.

International State System & Anarchy

From a Realist perspective, the anarchic state of international relations makes collective action on an international level to protect common pool resources more difficult than on the domestic national level, even when there are clear incentives to do so. As Ronald B. Mitchell argues, "the diversity in social, cultural, and economic preferences across countries means that, even if citizens of one country value a particular environmental amenity only as a source of existence benefits (or do not value it at all), citizens of other countries may value the amenity for its consumptive or nonconsumptive benefits", thus making it likely that usage or demand for an amenity may exceed its carrying capacity.[20] Additionally, the prevalence of relative gains

[20] Mitchell, R. B. (1999). International Environmental Common Pool Resources: More Common than Domestic but More Difficult to Manage. In: J. S. Barkin and G. Shambaugh, Eds., *Anarchy and the Environment: The International Relations of Common Pool Resources.*

concerns about market share in an international state system that maintains a balance of power also drives competition for resources. This places further stress on CPRs as not only are they permanently in high demand, but more perniciously, their linkage to national survival in the hierarchical state system encourages states "to increase their demands on the amenity to harm other countries as much as to benefit themselves".[21] This importance of relative gains highlighted by Mitchell corroborates Hardin's concept of the 'tragedy of the commons'. In some ways, this can also be seen to reflect the Greed, Efficiency, Fairness Hypothesis (as discussed above) applied on a macro-scale.

The theoretical framework of the anarchical international society highlights both the difficulty of implementing collective action policies on a wide scale, as well as the often suboptimal implementation of those policies due to ineffective planning, administration, and infrastructure. In turn, this forms the basis of this paper's exploration of the potential of local community solutions to global environmental problems, given that they are widely considered to be more attuned to local needs and incentives, and more easily kept in check by the communities themselves. Moreover, Mitchell's ideas highlight the importance of clarifying that 'top-down' solutions refer to two categories of solutions: supranational and/or global agreements, and domestic state-wide policies – while this paper does not explore the former in great detail, it recognizes that global top-down solutions also require further consideration and analysis.

Postcolonial Ecofeminism

Postcolonial ecofeminism is a theory based on the view that "the domination of women and the domination of nature are fundamentally connected and that environmental efforts are therefore integral with work to overcome the oppression of women".[22] As a perspective that "interrogates the intersection of gender, class and colonialism", exploring this relatively new area of scholarly focus may help to illuminate the gendered underpinnings of current CPR management strategies and point to ways in which they can be governed in more sustainable, equitable ways.[23]

One major ecofeminist observation in India by Rao has been that the interconnections of caste, class and gender issues ought to be central to the Indian

Albany: SUNY Press, 26-50. Available at: http://rmitchel.uoregon.edu/sites/rmitchel1.uoregon.edu/files/resume/chapters/1999-CommonPoolResources.pdf [Accessed 25.09.2016].

[21] Ibid.

[22] The Green Fuse. "Ecofeminism." *The Green Fuse*. 2016. Available at: http://www.thegreenfuse.org/ecofem.htm [Accessed 25.09.2016].

[23] Ibid.

environmental movement.[24] Rao further suggests that there may be a few gendered differences in how men and women use certain CPRs, with men perhaps more likely to use them to extract profit whereas women, often denied the opportunity to work, only use them in the capacity of sustenance. Odih has noted that the enclosure of water common resources disproportionately affects women because, as Marxist ecofeminists have observed, "the meta-industrial and reproductive activities that are carried out by women are vitally important to capitalism, but capitalism obfuscates, demeans or derides" them.[25] Hoetzer's ecofeminist analysis of Australia's response to Climate Change via the Carbon Pollution Reduction Scheme highlights how such schemes that rely on the 'polluter pays' principle (e.g. the Kyoto Protocol) serve in the interests and protection of the minority, "namely those with money and power, who are the most advantaged" to begin with.[26]

These three examples all emphasise the importance of not only acknowledging the interconnections between the societal and economic subjugation of women, people of colour, and the poor, but of placing these interconnections at the core of solutions to governing the commons. As Hoetzer (2011) firmly states, "until this happens, all living things, human and non-human will continue to be reduced into commodities, be it in the name of progress and modernity or as an assertion and reflection of a perceived superiority and an artificially constructed hierarchy of ownership and worth".

In relation to the paper, the theoretical framework of postcolonial ecofeminism provides a critical perspective on and solid defence of local, community-based solutions that manage common-pool resources in a way that is sustainable for all. It serves as a reminder that the tragedy of the commons, while potentially globally destructive, will have the most adverse effects on those populations that are most vulnerable – that it is important that any solutions aimed at resolving this imminent tragedy are mindful of existing inequalities and proactive in preventing their perpetuation in the name of environmental progress.

[24] Rao, M. (2012). "Ecofeminism at the Crossroads in India: A Review." *DEP* n. 20/2012. Available at: http://www.unive.it/media/allegato/dep/n20-2012/Ricerche/Casi/11_Rao_Ecofeminism.pdf [Accessed 25.09.2016].
[25] Odih, P. (2014). *Watersheds in Marxist Ecofeminism*. (Cambridge: Cambridge Scholars Publishing).
[26] Hoetzer, I. (2011). Ecofeminism and Environmental Justice. In M. Cotton & B. H. Motta, Eds., *Engaging with Environmental Justice*. Oxford: Inter-Disciplinary Press, 3-10. Available at: https://www.academia.edu/6395407/Engaging_with_Environmental_Justice_Governance_Education_and_Citizenship [Accessed 25.09.2016].

I.4 What makes good CPR management?

Important variables that determine the success of different CPR management include technology, the nature of the user group and its relationships with CPRs and with the state, whether or not regulating access to the resource is straightforward, and the degree of noticeability of freeriders. Two studies are considered below which highlight often overlooked factor in CPR management: the mobility of the resource and its net collective benefit to the community.

The mobility of the resource is an important independent variable that should be a major consideration for any CPR management strategy. Altrichter and Basurto's study on the effects of land privatisation on the use of CPRs in the Argentine Chaco revealed two major mediating factors, one of which was the mobility of the resources in question. In the *Impenetrable,* a location within the Argentine semi-arid Chaco, the low-income peasant residents depend on a variety of wildlife and forest resources to sustain their livelihoods[27]. Certain species of flora and fauna provide food, while others provide materials and resources for commercial trade. In the early eighties the central government began advocating land privatization to local peasants as well as non-locals under the assumption that it would encourage the sustainable consumption of these resources and improve the rural people's standard of living. In their study, Altrichter and Basurto compared the harvesting practices of CPRs of varied mobility before and after the conversion of land to private property to assess the effects of privatisation. They found that the growth of private ownership of land in the low income peasant population increased control of access to stationary and low mobility CPRs, but that highly mobile CPRs continued being used as open access and over-exploited. Specifically, the spread of land titling did not result in a change in local peasants' attitudes and perceptions towards the rights of access to, and ownership of, mobile game species, such as peccaries (highly valued as a source of meat and for their hides), which were still treated as open-access resources due to their free movement. In contrast, land ownership did have a positive impact on the protection of immobile CPRs such as trees and low-mobility CPRs such as the armadillo (valued for its meat) and parrot chicks (which have high commercial value for export as pets). This is because private land ownership facilitated the creation of access controls against non-owners such as hunters, neighbors and logging companies, but such controls could only realistically be applied to CPRs that stayed within the property boundaries.

The second variable identified by Altrichter and Basurto was the type of owner

[27]Altrichter, M. & Basurto, X. (2008). "Effects of Land Privatisation on the Use of Common-pool Resources of Varying Mobility in the Argentine Chaco". *Conservation and Society* 6(2): 154–165. Available at: http://fds.duke.edu/db/attachment/1505 [Accessed 25.09.2016].

given ownership of land following such privatisation policies. They observed that privatisation of land by large absentee landowners, specifically corporations, seriously threatened the conservation of the ecosystem in general as well as the ability of low income peasants to maintain their livelihoods. This is because for profit-seeking actors, "[c]onservation will not be favoured as long as transforming or liquidating the natural resource brings the highest rewards"[28], as reflected in the Argentine *Chaco* where these actors sought to gain 'a maximum rapid return' on their investment, most commonly turning to cattle ranching. Creating pastureland in order to facilitate cattle ranching is hugely damaging because it entails stripping the land of a significant amount of the wildlife commons it holds, with low mobility species being the most gravely endangered. As this study reveals, therefore, the prevalence of large absentee owners signifies major problems for those who encourage land privatization in order to incentivize the protection of the commons, as such owners are incentivized to extract profit from their land in the most efficient way, often disregarding issues of environmental sustainability as a result. In the societal context, the experience of the Argentine *Chaco* also demonstrates how privatization by large corporations can worsen social inequalities by effectively cordoning off access to multiple natural CPRs that are vital for the survival and livelihood of locals, if such CPRs are not eradicated in the first place. It also presents a caveat to Hardin's claim that a system of private property helps to incentivise owners to protect the commons by making it in their interest to do so – it seems that individual ownership is not enough, and that there must be guidelines for sustainable and responsible ownership of such finite resources. It appears therefore that horizontal and vertical cooperation between governments and local-level communities is not only beneficial but necessary to effective management.

In the context of community-level CPR management, an important variable highlighted in Wade's study on village resources in South India is the net collective benefit of collective action, alongside other contributing factors such as the characteristics of the resource, the user group, and group-state relations[29]. In his study of 31 irrigated villages in Kurnool district in South India, Wade observed a strong link between the main causes of conflict within the village and the types of collective organization that had been implemented. He noted that the impetus for central village control arises from the characteristics of Kurnool district: being both semi-arid and densely populated, the most common causes of social conflict and production loss were trespassing animals and thieves, as well as the unrestrained use of irrigation water.

[28] Ibid.

[29] Wade, R. (1987). *The management of common property resources: collective action as an alternative to privatisation or state regulation.* "Cambridge Journal of Economics", 11, 95-106. Available at: http://www2.econ.iastate.edu/classes/tsc220/hallam/CommonPropertyResourcesWade.pdf [Accessed 25.09.2016].

Hence, collective organization mainly targeted these potential problems, with policies such as the regulation of canal irrigation systems and livestock grazing. Thus, Wade concluded that "it is possible for an interest group organisation to emerge voluntarily and be sustained, on the whole, voluntarily – that is, without selective benefits or costs—if the net collective benefit is high enough".

These cases suggest that treating a CPR management strategy that has been successful in one context as a blueprint or one-size-fits-all template to be replicated in other situations, even for the same resource, is unlikely to reap similar success. Rather, there are differences in characteristics among CPRs and the geographic and socio-economic contexts concerned, and methods to manage them must be tailored to account for this.

II. How are CPRs managed now?

II.1 Existing Local Solutions

To understand whether the future of CPR management lies in local solutions, it is important to evaluate the successes and failures of existing and past initiatives undertaken by different countries. This section looks at three different types of community-supported environmental initiatives, namely agriculture, forestry, and energy.

II.1.i Community-Supported Agriculture

Community-supported agriculture (CSA) is a local socio-economic model that manages agriculture and food distribution. As a result, it is an intriguing model of organisation when one is contemplating local solutions to CPR management. The movement's origins can be traced back to the Swiss farmer, Jan Vander Tuin, who played a leading role in establishing the CSA movement in America, and who counted among his influences Rudolph Steiner's anthroposophy.[30] The basic premise of a CSA is to establish a core consumer group that will fund farm production in return for a regular dividend of the farms produce, typically vegetables.

Structurally, CSAs vary, from farmer-managed CSAs where members 'subscribe' to a weekly payout, to non-profit farms established independently by shareholders who then hire a farmer, or a mixture of the two.[31] Likewise, many different models of CSA have since evolved based on a variety of philosophical, economic and instrumental factors, but commonly emphasise shared-risk communal ownership and management, new and non-alienating production relationships, and the production of sustainable organic and biodynamic food.[32] Communal ownership means that such organisations are highly democratic, although agricultural authority is often delegated to the employed farmers, and such models often feature a core management group who invest greater time in the farm than the wider members/subscribers in receipt of harvests. As such, it may be seen that principles of communism are ingrained in the organisation, although the principal emphasis may vary between models from being

[30] McFadden, S. "The History of Community Supported Agriculture, Part I: Community Farms in the 21st Century: Poised For Another Wave of Growth?" *Rodale Institute.* 2016. Available at: http://www.newfarm.org/features/0104/csa-history/part1.shtml [Accessed 25.08.2016].

[31] Committee on Twenty-First Century Systems Agriculture, Board on Agriculture and Natural Resources, Division on Earth and Life Sciences, National Research Council. (2010). *Towards Sustainable Agriculture in the 21st Century.* (Washington D.C.: National Academies Press.)

[32] Feagan, R. & Henderson, A. (2009). "Devon Acres CSA: Local Struggles in a Global Food System". *Agriculture And Human Values.* 26(3). Pp.203-17. Available at: http://link.springer.com/article/10.1007/s10460-008-9154-9 [Accessed 25.08.2016].

one of deliberate common ownership to simply seeking organic and ethically farmed food.

There is overlap between CSA and the Kibbutzim movement, which began in the early 20th century as a marriage of Zionism and socialism. This historical example is significant in demonstrating the viability of a community-led CPR management arrangement. Kibbutzim is a collective farming endeavour, and while it has receded, 270 kibbutzim were recorded in Israel in 2010, accounting for 40% of Israeli agricultural output and 9% of industrial output.[33] Reasons for the decline of Kibbutzim include the the gradual introduction of a 'differential wage,' paid according to the perceived value of different labouring tasks instead of according to needs, as well as increased privatisation. Far from being a sustainable closed system, Kibbutzim relied heavily on government subsidies and land donations from the Jewish Trust. Consequently, it has received criticism for its inefficiency and reliance on credit.[34] This demonstrates that CSAs have many different factors that contribute to their overall success and sustainability. The following two case studies explore existing examples of CSAs that have managed to achieve relative success in the management of land resources.

Case Study: Stroud Community Agriculture Ltd., the Cotswolds, U.K.

Describing itself as a "community-led enterprise," Stroud Community Agriculture (SCA) is an agricultural project where members pay a £40 monthly fee in return for an organic/biodynamic vegetable basket each week.[35] This collaborative project emphasizes the shared responsibility of the farmers and consumers for the risks and rewards of farming. Currently, SCA leases 24 acres, with the goal of leasing up to 100 acres. The farm currently feeds 220 households per week, while also paying its two hired farmers a fair wage in return for their labour. The farm is managed by an elected core group that meets monthly, and that hosts public meetings. It "grew out of a growing interest in sourcing locally produced food and in a deep felt wish to transform [the community's] self-serving competitive economic system into one of mutual support". Hence, it combines a 'green' and organic food production agenda with a looser theme of alternative economic structures.

Advantages

[33] Taipei Times. "Kibbutzim reinvents itself after 100 years of history." *Taipei Times*. 2010 Available at: http://www.taipeitimes.com/News/editorials/archives/2010/11/16/2003488628/2 [Accessed 25.08.2016].
[34] Kislev, Y., Lerman, Z., and Zusman, P. (1991). "Recent experience with cooperative farm credit in Israel." *Economic Development and Cultural Change*. 39(4):773-789. Available at: https://www.jstor.org/stable/1154594 [Accessed 25.08.2016].
[35] Stroud Community Agriculture. "Introducing SCA". *Stroud Community Agriculture Ltd.* 2016. Available at: www.stroudcommunityagriculture.org/about-sca-farm-2/introducing-sca/ [Accessed 25.08.2016].

The farm has clearly been successful in its goal of transforming farming into a collectively owned enterprise in which all contributors receive produce at the standards and ethical level they desire.

Disadvantages

The farm is gifted with the agricultural conditions that make the basic act of production itself achievable to a high and consistent standard. This allows the farm to focus on its economic viability, ideology, and food quality in a manner that less equipped ecosystems cannot afford to do. Members buy into the farm not out of necessity but out of ethical consciousness, a desire for localism, environmentalism and a romantic intrigue over common ownership – what some might call middle-class privileges. That said, a bursary scheme is available for those who feel the costs are too high.[36]

Moreover, the farm has not yet expanded enough to offer full dairy and meat supplements. In other words, the farm would not work in a closed system; members use the farm to supplement their supermarket shops, optionally paying in excess of market prices for the organic/biodynamic standards it offers.

Evaluation

SCA is an interesting example of a CSA. While its weaknesses have been discussed, this should not detract from the fact that the farm finds a sustainable way of managing and reproducing common pool resources. Thus, its structure and organisation are commendable, and instructive for local-level planning initiatives.

Case Study: Temple-Wilton Community Farm, U.S.A.

The Temple-Wilton Community Farm (TWCF) was one of the original CSA projects in the northern USA in 1986.[37] Similar to SCA, TWCF is driven by the core ideas of new kinds of property law concerned with communal ownership, a replacement of employer/employee social structures with more egalitarian human networking relationships, and anti-profit driven development grounded in community needs. But TWCF goes one step further than SCA in setting no quota for members to extract from the farms produce. Instead, members are encouraged to take the food produced based on how much they need, despite members paying a numerically equal

[36] Ibid.
[37] McFadden, S. *The History of Community Supported Agriculture, Part I*.

contribution to fund the farms annual budget of $124/adult/month,[38] adhering closely to Marx's classic adage: "from each according to his ability, to each according to his needs". Consequently, "[t]his is different from most other CSA's which sell a share in the harvest and then give out a fixed portion of produce".[39] Those who can afford more than the average are moreover encouraged to contribute more so that those who cannot meet the average contribution may still join.

TWCF truly does look to revolutionise typical liberal economic norms. The high potential for individuals to exploit the farm enhances the shared risk factor of communal ownership in a manner different to SCA, but rather than destabilizing the project, as per Hardin's hypothesis, game theory, and rational economics, this risk reinforces the project.

Advantages

Spanning over 200 acres, TWCF has diversified its produce over time, farming biodynamic vegetables, dairy products, chickens, pigs, beef, etc. It can thus be seen to succeed in challenging individualistic economic norms. The model has been in place for 30 years now, so has clearly proven popular, sustainable and successful, making it an exemplar model for replication to help establish sustainable common pool resource management elsewhere in the word.

Disadvantages

The monthly contribution only covers vegetables and up to 4 gallons of milk; other produce is charged separately. While the farm professes its revolutionary structure where members take not an equal share, but instead what they "need", they concede that with small harvests of particular item, a maximum amount is indicated. While this is understandable, it does undermine the farms ideology by demonstrating some distrust when it comes to CPR management. Finally, TWCF also receives a mixture of state, federal and local funding.[40] While it is commendable that governments are investing support in sustainable agriculture projects, it is not immediately clear what this funding covers, suggesting that membership fees alone may not be sufficient to fund a harvest. This reveals a potential financial gap in the model, a cited criticism of the Kibbutzim movement above.

[38] The Temple-Wilton Community Farm. "CSA Membership". The Temple-Wilton Community Farm. 2016. Available at: http://www.twcfarm.com/csa-membership [Accessed 25.08.2016].
[39] Ibid.
[40] McFadden, S. *The History of Community Supported Agriculture, Part I*.

Evaluation

TWCF was one of the original northern American CSA projects, and has clearly flourished in the 30 years since it was first established. The farm manages a range of produce, even if only a portion of this is included in the membership package, giving it at least the *potential* for a fully closed system community food management system. TWCF operates on a large scale, and has found a viable model for CPR management, even if further research into the capacity of its state and federal funding should be made to judge the true success and sustainability of its socialist structure of payouts.

Summary

In conclusion, the above CSAs can be seen to be advantageous in their model of agricultural production, in that they are able to harness the power of community to the end of sustainable farming. It is important to note that, apart from partial financial subsidization from the government, these initiatives remain largely independently-run, relying on their respective communities for support in their operation. Thus, it may be seen that private ownership, not in the sense of individual ownership but *collective* private ownership, may function as a viable means of managing land resources in certain conditions.

At the same time, it must also be noted that given that the two case studies were taken from relatively similar Western contexts, and present examples of supplementary rather than primary agricultural production, their significance should not be exaggerated as exemplary; rather, they should serve as instructive instances of successful collective CPR management.

II.1.ii Community Forestry

Community forestry is "any situation that intimately involves local people in forestry activity".[41] It looks to generate income from timber and non-timber products whilst simultaneously regulating ecosystems and ensuring sustainability. Stakeholders in community forestry projects include governments, NGOs and local community, and hold shared vested interests in sustainability, whether for income, longevity or environmentalism. For example, farmers in the Philippines manage and cultivate forest lands to supply pulp to industry; managing the forest in a sustainable way thus creates a steady and long-term income.[42] Managing the forest is not just good for markets, it is good for the household too; it preserves community livelihoods, vital natural resources, soil quality, fuel, and moreover promotes entrepreneurship.

At the same time, forest management is rife with complexities. Variables that will no doubt affect the success of a forest management project include the attributes of the resource system, attributes of the user group and attributes of the government, as well as the networks and relations between them.[43] Likewise, the legalities of landownership, technology, knowledge, organisational capacity, funding and illegal loggers all affect community forestry.[44] The following two case studies explore existing examples of CSAs that have managed to achieve relative success in the management of forests.

Case Study: Nepal

Local involvement has proven to be directly linked with the success of forest management, as proven by the failure of state-run forestry initiatives in the past. In Nepal, the state nationalised the forest in 1957, but could not achieve the necessary levels of organisation and oversight to successfully manage it, particularly in the case of

[41] Food and Agricultural Organisation the United Nations, FAO. (1978). *Forestry Paper 7: Forestry for Local Community Development.* Available at: http://www.fao.org/docrep/t0692e/t0692e00.HTM [Accessed 25.08.2016].
[42] Hyman, E.L. (1983). "Pulpwood treefarming in the Philippines from the viewpoint of the smallholder: an ex post evaluation of the PICOP project". *Agriculture Admin.* 14: 23–49. Available at: https://www.researchgate.net/publication/223025258_Pulpwood_treefarming_in_the_Philippines_from_the_viewpoint_of_the_smallholder_An_ex_post_evaluation_of_the_PICOP_project [Accessed 25.08.2016].
[43] Nagendra, H. (2007). "Going Beyond Panaceas Special Feature: Drivers of reforestation in human-dominated forests". *Proceedings of the National Academy of Sciences.* 104(39): 15218–15223. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2000538/ [Accessed 25.08.2016].
[44] Hajjar, R., McGrath, D.G., Kozak, R.A. and Innes, J.L. (2011). "Framing community forestry challenges with a broader lens: Case studies from the Brazilian Amazon". *Journal of Environmental Management*. 92(9): 2159–2169. Available at: http://www.sciencedirect.com/science/article/pii/S0301479711001083 [Accessed 25.08.2016].

remote communities.[45] This led to overuse, which the state lacked the capacity to regulate. 1978 saw an attempt to hand management control to local bodies, although very little land was handed over. Consequently, the Forestry Act of 1993 established Forest User Groups (FUGs) in an attempt to increase community participation in forest management.[46] This established a shared stake in the success of forest management, much like the ownership structure of CSAs. The result is that the state continues to own communal land, but local communities have gained the right to participate in managing the land. Given the reciprocal trust and strong communal sentiment of these communities, management has continued to be a success.

Advantages

This case firstly reinforces the notion that collective ownership and shared stake holding is a powerful incentive for community-based CPR management. At the local level, community ties within traditional societies help to resolve the tragedy of the commons.[47] Secondly, and perhaps more importantly, however, it demonstrates that there remains a continued role for the state, even when it comes to establishing local solutions – the two are not mutually exclusive, rather, they work best in tandem with one another. The power of the state, combined with the vested interests of local communities, proves a finely tuned balance for perfecting common pool resource management.

In the Nepalese case, FUGs have proved beneficial, not just in terms of managing forests but also in providing citizens with low-interest loans, developing infrastructure in remote areas, and promoting other community businesses and enterprises for communal benefit, for example, carbon sequestration and improved water-quality.[48] This suggests that a wealth of local interests can be realised by the successful management of forests, and the more general coupling of government initiatives with local community projects. In the future, further research should be undertaken as to how the state can continue to aid local solutions to common pool resource management; the state should be viewed as a tool, not an obstacle.

Disadvantages

Continued legal complexity, and frequently changing policy impacts the power delegated to FUGs. Large parts of the forest continue to go unregulated, allowing

[45] Upadhyay, S. "Community Based Forest and Livelihood Management in Nepal". *The Wealth of the Commons: A World Beyond Market & State.* Available at: http://wealthofthecommons.org/essay/community-based-forest-and-livelihood-management-nepal [Accessed 25.08.2016].
[46] Ibid.
[47] Ibid.
[48] Ibid.

deforestation to occur at an alarming rate; without willing local communities, the state continues to lack the capacity to manage the forests by itself. There is also a knowledge gap between the state and these communities, highlighting the necessity of technological knowhow/resources/education to successful management.[49] Finally, the success of the this model lies in state-ownership, even if the state itself fails to regulate land and often delegates management. As such, nationalised land removes individuals' landownership rights, a predicament that would not be easily replicable in other societies.

Evaluation

Community forestry in Nepal demonstrates how the state and local communities can *together* achieve a successful level of common pool resource management, and not succumb to Hardin's tragedy of the commons. Shared stake holding and communal vested interests in the welfare of the forest are key to its success, as it is where groups feel excluded from the benefits that deforestation continues to occur unregulated in Nepal. Incentive is key.

At the same time, not all communities will have such access to common or nationalised lands, as property ownership continues to be the buzzword of Western development initiatives. The extent to which a society is able to embrace community-based CPR management depends, at least to some degree, on whether it has a history of traditional communitarianism. These are key factors that must be considered when looking to develop community forestry models further.

Case Study: Indonesia

The history of forest management in Indonesia is, to some degree, similar to that of Nepal. The Basic Forestry Law of 1967 claimed most of the country's forestland as state property.[50] Claiming that individual land rights were responsible for years of mismanagement and deforestation, the Suharto government limited local usage. From then on, Suharto granted concessions to timber and plantation companies, generating considerable profits for the Indonesian government. Yet this proved utterly unsustainable: 35% of Indonesian forest was lost by 1982, or some 50 million hectares. In 1995, new legislation provided the first community forestry programme in

[49] Nagendra, H. "Going Beyond Panaceas Special Feature: Drivers of reforestation in human-dominated forests."

[50] RECOFT. "Community Forestry in Indonesia". *RECOFT: The Centre for People and Forests.* 2016. Available at: http://www.recoftc.org/country/indonesia/basic-page/community-forestry-indonesia [Accessed 25.08.2016].

Indonesia; communities could now apply for a 25-year lease of forest land.[51] This reestablished local access to the forest as a common pool resource, even though it has also been suggested that the policy was equally a cheap ploy to use communities to restore exploited land . By 1999 however, with Suharto's resignation, the 1967 law was revised, and Suharto's systematic exclusion of local people from involvement with the forests was steadily undone. Like in the case of Nepal, the state continued to own the forestland, but now allowed local communities to engage in its management. Community-Based Forests (or HKm) grant farming groups 35-year leases to manage, protect and harvest the forests, while Village Forests gives local institutions a similar lease.

Advantages

As with Nepal, this case study demonstrates that the most effective model of forestry management is one that utilises the power of the state while also giving local communities the necessary power and incentive to manage the forest successfully. Statism and localism resolve the weaknesses of each other, corroborating Hardin's claim that ownership (in this case – by the state) does help alleviate the tragedy of the commons.

It is important to note that this is not the *private* ownership that concerned Ovetz, as local communities still retain the right to use the land, and are not alienated from it. Rather, it is a move towards collective ownership, mobilized on the state and community levels. Before this, when the state simply nationalised the land, it was unable to regulate it, being too transcendent as a property owner and detached from vast areas. As a result, the tragedy of the commons continued – local groups exploited the land at will in their bids to commonize the costs and privatise the profits. Now, however, the state's capacity to 'lease out' the forest combines the long-term power of property ownership that Hardin saw as a necessary internalisation of costs, with a facilitation of the communication and acting-upon of local needs and empowerment by the state for local communities, achieving a middle-ground of neither strictly private nor nationalised nor freely communal ownership that checks the weaknesses of each.

Disadvantages

While the 35-year lease grants local communities considerable power over the forest, this is again mired in legal complexities contingent upon changes in government policy. The model is largely reliant on non-interference from the state, and assumes that subsequent administrations or changes in leadership will not wish to implement changes to the model. Thus, local solutions based on governments empowering local communities are perpetually vulnerable to a certain degree of long-term insecurity.

[51] Ibid.

Likewise, only time will truly tell whether this model, and the new ownership dynamic established here, will be a success.

Evaluation

Overall, similar advantages/disadvantages to community forestry in Nepal, see conclusions above.

Summary

Community forestry lies at the confluence of state-enabled action and local, community-based initiative. The two case studies above demonstrate that such "simultaneous" management can be successful, provided that the conditions are appropriate and there is sufficient incentivization of local communities. This is not to say, however, that such programmes can be instituted everywhere; the need for an existing culture of communitarianism as well as efforts to sustain this mentality have been, among other things, key factors in the success of the community forestry projects of Nepal and Indonesia, and bear remembering when attempting such policies in other countries.

II.1.iii Community Energy

Community energy projects exist when members of local communities look to establish sustainable local alternatives to provide energy and power. Such projects emerge for a variety of interlinked reasons, including climate change, energy security and fuel poverty.[52] A community energy project acts as an intermediate between individual private actions and state-level negotiations to climate change/energy crises. Community energy also empowers people who can personally take the initiative, inspires in a way that governments and journalists fail to, is efficient, and encourages careful usage. Consequently, uncovering exemplar community energy models has numerous benefits, while also sustainably tapping into common-pool resources that cannot be depleted (E.g. Hydro-, solar-, or wind-power).

Case Study: Settle Hydro, Yorkshire, U.K.

Settle Hydro is a community energy project and a registered society under the 2014 Cooperative and Community Benefits Societies Act.[53] It harnesses the power of the the river Ribble to produces hydroelectric power in Settle, Yorkshire. A small amount of power is used to supply the adjacent mill building, while 90% of the power generated is fed to the the National Grid, and purchased by the Government's feed-in tariff scheme (FIT)[54]. It is managed by voluntary directors, appointed by the shareholders (members), where all shareholders have one vote, regardless of their number of shares. This is a standout example of a local initiative looking to better manage common-pool resources by investing in sustainable energy. Manual maintenance is done by volunteers such that as more people contribute help, each must invest fewer hours of their time.

Advantages

Settle Hydro is notable for its success in tapping into a sustainable and finite common-pool resource to the benefit of its surrounding community.

Disadvantages

Office of Gas and Electricity Markets (OFGEM) regulations often hold up payments from the FIT.[55] This demonstrates how local initiatives, whether energy-

[52] Clarke, D. and Chadwick, M. (2016). *The Rough Guide to Community Energy.* Rough Guides. Available at: https://www.bre.co.uk/filelibrary/nsc/Documents%20Library/Not%20for%20Profits/Rough-Guide-to_Community_Energy.pdf [Accessed 30.08.2016].
[53] Settle Hydro Ltd. "Settle Hydro: A Pioneering Community Hydroelectric Scheme Generating Funds for Local Community Projects". *Settle Hydro.* 2016. Available at: http://www.settlehydro.org.uk [Accessed 30.08.2016].
[54] Ibid.
[55] Clarke, D and Chadwick, M. (2016). *The Rough Guide to Community Energy.*

based or not, still rely on the state and the incentives it can offer. Additionally, the project required large initial investments (£410,000) and was denied planning permissions several times.[56] This shortfall in funding was also reflected in Kibbutzim (see above). Thus, despite projects of this nature being encouraged by carbon-conscious local and national governments, they are also blocked and barred by them.

Evaluation

Settle Hydro Ltd is an admirable attempt to find a local sustainable energy solution that does not deplete or harm natural resources, but also allows the community to exploit (in a good way) common pool resources for community benefit. However, it remains a concern that state and government apparatus continue to place restrictions on the potential of these local projects.

At the same time, it would be equally concerning to remove all government power from this project. Thus, regulations and restrictions must exist for the good of the community, but governments must find more efficient and effective ways of empowering these good-intentioned local projects. It is unclear, however, who should be the judge of this. Moreover, funding deficits appear likely to continue to plague local community energy projects.

Summary

Community energy projects remain fraught with difficulties in their planning and implementation. It remains difficult to envision a future in which energy becomes a CPR controlled by small communities; the reality is that, in its many forms, energy (especially nonrenewable energy) is a commodity that remains in the control of large multinational corporations and governments, whether that be in actual terms or in the case of Settle Hydro, in terms of regulation. However, this does not mean that such projects are devoid of instructive quality; in a world moving towards renewable energy, they demonstrate that it is possible for communities to become self-sufficient, provided that they have the adequate financial backing and communal support.

[56] Ibid.

II.2 Existing Top-Down Solutions

Local solutions have varying levels of effectiveness, depending on the circumstances of their planning and implementation. In order to evaluate whether or not they are more advantageous than top-down solutions, however, some attention must be given to the state of the latter. As mentioned previously, this paper acknowledges that top-down solutions include both global initiatives as well as state-based domestic regimes – after a preliminary discussion of examples of the former, this paper will hone in on particular domestic examples of CPR management.

The Responsibility to Protect (R2P)

During the 2005 World Summit (14-16 Sep 2005), the 'Responsibility to Protect' (R2P) was endorsed by all member states of the United Nations57. It is a global political commitment to prevent ethnic cleansing, war crimes, crimes against humanity and genocide. The underlying premise of R2P is that sovereignty implies a duty to protect all populations from human rights violations. It is founded on the premise that sovereignty is contingent upon a state's ability to fulfil international obligation, a sharp break with previous definitions of state sovereignty which focused primarily on securing rights of territorial autonomy and self-determination. The authority to use force to prevent and protect under the R2P commitment is considered a measure of last resort.

R2P can be seen as important in the bid for better management of common-pool resources because it can be invoked to justify UNSC authorised interventions in times of human rights crises – one of the closest examples of top-down governance in international politics (although the limits of such a policy must also be acknowledged, and it does not perhaps earn itself the title of 'supranational'). In 2010, environmental lawyer Polly Higgins proposed to the United Nations that an international law of Ecocide serve as an environmental equivalent to R2P:

> "Often referred to as Climate Crime, Ecocide is also a law that puts in place a criminal wrong. Existing laws, such as international declarations, treaties and protocols do not have the legal teeth to impute State responsibility and the necessary legal duty of care – owed by States on behalf of the public. Ecocide law is public law in the widest sense; giving protection to those at risk of being displaced, upholding the rights and duties of humanity as a whole as well as the rights of future generations, nature and indigenous rights… The intent behind the drafting is to ensure that people and planet are put first and to create a legal

[57] Hehir, A. (2011), "The responsibility to protect in international political discourse: encouraging statement of intent or illusory platitudes?" *The International Journal of Human Rights,* 15(8). Available at: http://www.tandfonline.com/doi/abs/10.1080/13642987.2010.521128?journalCode=fjhr20 (Accessed 25.09.2016).

duty of care to a) prohibit the causes of mass damage and destruction, b) prevent future significant harm from taking place and c) preempt both human caused and natural Ecocides that put nations at risk of being unable to self-govern."[58]

Higgins makes her case for ecocide to be considered as the "fifth crime against peace" by emphasizing the link between resource extraction, resource depletion, and conflict. She highlights not only the fact that ecocide has devastating effects on humankind, but also on all species; a law of ecocide would place the onus on the international community to end the mass destruction of ecoystems for the benefit of the entire Earth[59]. The growing trend towards top-down solutions to common pool resource management is thus embodied in this movement, which looks to build further upon the international treaties, cited below, that the Ecocide movement acknowledges to often lack the "legal teeth" to be fully effective.

EU Environmental legislation

The European Union has substantial environmental laws which have significant effects on its member states[60]. The European Union's environmental legislation addresses a large range of issues including: the thinning of the ozone layer, waste and water pollution, sustainable energy and air quality. Policy making in the EU can be very complicated. Due to a large amount of veto players it is difficult to consistently control the direction of policy making. The European Commission has recently developed 'standard operating procedures' for policy making. This has resulted in changes in the policy making process: the impact assessment of all policy proposals; minimum standards of consultation; and earlier publication of proposals to allow for sufficient notice.

Currently, the main trend in EU environmental policy-making is deciding what should the EU be doing. Rather than creating new policies, usually already existing policies are changed (either strengthened, weakened, or updated). The integration of environmental policy in other policy sectors is challenging. Sectors such as energy or transport usually exclude environmental problems from consideration. However, the biggest problem that the European Commission faces in the actual implementation of

[58] Eradicating Ecocide. "The Law." *Eradicating Ecocide*. 2016. Available at: http://eradicatingecocide.com/the-law/ [Accessed 20.09.2016].
[59] Jowit, Juliette, "British campaigner urges UN to accept 'ecocide' as international crime". *The Guardian.* 2010. Available at: https://www.theguardian.com/environment/2010/apr/09/ecocide-crime-genocide-un-environmental-damage [Accessed 1.2.2017].
[60] Jordan, A. (2012). *Environmental policy in the European Union: actors, institutions, and processes.* (Oxford: Routledge).

environmental policy[61]. Many ambitious policy objectives have been accepted, but not fully or partially implemented. As a result, certain policies end up becoming "paper exercises" rather than solutions for environmental challenges, and in the process of doing so distort the single market. Due to the very structure of the EU, which is fragmented both politically and institutionally, policy implementation in the EU is regarded as being problematic. Additionally, policy evaluation is also challenging due to the system of multilevel governance. European Environment Agency is involved in policy evaluation, but in general policy evaluation in the EU is still relatively weak.

The European environmental research and innovation policy is a set of programs which aim to promote more and better research and innovation for building a resource-efficient society that generates less environmental damage. At the Rio+20 Conference on Sustainable development in 2012, the United Nations developed a set of Sustainable Development Goals (SDGs). The European environmental research and innovation policy is a programme which was developed to be integrated into the United Nations development agenda. Therefore it is also a global initiative. Due to its many environmental programmes that promote environmental policy, research and innovation, the EU can be considered a global influencer in international environmental negotiations.

Paris Treaty 2015

The 2015 United Nations Climate Change Conference was held in Paris. The conference discussed the Paris Agreement to reduce climate change, which represents the consensus of the representatives of 196 parties. The deal is the world's first comprehensive climate agreement. The long term objective of the treaty is to keep the global average temperature well below 2°C' governments also agreed that global emissions should peak as soon as possible, while acknowledging that this may take longer for developing countries. The signatories also agreed to rapidly reduce emissions in accordance with the best available scientific findings.

Every 5 years, the governments will come together to set more aspiring targets. They also agreed on tracking their progress towards the long-term goal[62]. The progress should also be reported to the public and other involved countries. By accepting and implementing all of these strategies, societies' ability to deal with the impacts of climate change will strengthen. The EU and other developed countries agreed to provide continous international support for adaptation to developing countries. They also

[61] Ibid.
[62] Sutter, J. D., Berlinger, J, and Ellis, R., "Obama: Climate agreement 'best chance we have' to save the planet". *CNN*. 2016. Available at: http://edition.cnn.com/2015/12/12/world/global-climate-change-conference-vote/ [Accessed 26.09.2016].

agreed to aid developing countries in improving resilience to the impacts of climate change. Other, less developed countries, were also encouraged to provide such support voluntarily.

The Paris agreement differs from the Kyoto Protocol because of the limited participation of the EU in the latter conference. The first major economy to submit its intended contribution towards the realisation of the new agreement was the EU. It is currently taking steps to implement its target to reduce emissions by at least 40% within a decade.

The three global initiatives mentioned above are examples of global compacts aimed at not only encouraging sustainable practices in CPR management, but also upholding human rights, and protecting other aspects of the environment. While they are powerful markers of a global move towards increasing international coordination and cooperation in certain areas and towards certain issues, criticisms of these regimes abound, not least including claims that they represent "green imperialism" on the part of the Global North towards the Global South[63], corroborating the Realist, anarchical international society perspective. This set of critiques lies beyond the scope of the paper, however, it is important to note that it exists.

Subsequently, this paper will explore domestic, state-based, top-down initiatives in managing CPRs, aiming to extract general lessons from these case studies that can be applied to individual states' management strategies. These recommendations may also be applied to global environmental initiatives, however, it must be emphasized that because of the urgency of the tragedy of the commons, it is imperative that the international community does not fall into the trap of what Jackson called the "declarative tradition" – ramp up its obligations on paper via treaties without carrying those actions through[64]. What will be required is a three-way movement of proaction on the part of international organizations and agencies, state governments, and local communities, in order to ensure that the future of CPR management is sustainable.

[63] Associated Press. "Rich nations accused of 'green imperialism'". *The Guardian*. 2007. Available at: https://www.theguardian.com/world/2007/jun/25/china.environment [Accessed 26.09.2016].
[64] Jackson, R.H. (2000). *The Global Covenant: Human Conduct in a World of States.* (Oxford: Oxford University Press).

II.2.i Top-Down Land Management

For many countries in the developing world, particularly in Africa, the public ownership of land became the norm in the period following independence. This trend owed itself partly to the residual influence of colonialism in patterns of landownership, and also to the context of the Cold War. The experiment of collective ownership in the majority of these countries was unsuccessful. The examples offered by the abolition of the private tenure of land in Vietnam and Ethiopia in the 20th century demonstrate the shortcomings of government ownership of land, and why private systems of management, which offer greater security and a better balance of incentives to occupants, are preferable.

Case Study: Vietnam

Vietnam's departure from a collectivised system of agricultural production in 1981 resulted in Vietnam becoming a net exporter of rice in 1989, having for the previous two decades been a net importer of rice.[65] The system implemented after 1981 was household-driven and contractual, similar to the "household responsibility" system introduced in China in 1979. By 1984, average rice yields relative to 1980 yields for the northern and southern provinces were 32% and 24% higher respectively, and in the same period, annual rice production per capita increased by approximately 40 kilograms.[66] Changes introduced from 1988 further liberalised land management by increasing security of tenure, privatising output markets, decentralising input supplies, while delegating crop choice and management to households, effectively transferring rice production from a government-led contractual system to an essentially private one.

These changes marked a transition away from the collective forms of land management which had been predominant in large parts of the country since the end of the Second World War. During this period, much of Vietnam's rice producing land was managed by cooperative farms, which operated through the pooling of labour. In the North, the collectivisation process had consisted of the conversion of private holdings into "low rank" cooperatives, which were subsequently consolidated into "high rank" cooperatives.[67] In low rank cooperatives private ownership of plots, animals and equipment continued. Work was directed in accordance with a cooperative system of planning. High rank cooperatives meanwhile more resembled collective farms, where members pooled property and worked under a cooperative management. Payment was given according to a points system allocated on the basis of the quantity

[65] Pingali, Prabhu L., and Xuan, V.T. (1992). "Vietnam: Decollectivization and Rice Productivity Growth." *Economic Development and Cultural Change.* 40 (4), 697-718. Available at: https://www.jstor.org/stable/1154630?seq=1#page_scan_tab_contents [Accessed 26.09.2016].
[66] Ibid.
[67] Ibid.

of work performed, and its quality. Since quality was difficult to monitor, and often led to friction among members of the cooperatives, the point system was eventually replaced by a fixed point system for hours worked. Following this change, cooperative workers lacked an incentive to produce work of a good quality, and productivity subsequently fell.

Prior to collectivisation in the South, rice output expanded considerably in the decades 1955-1965 and 1966-1975. The South had maintained a largely independent economy until 1976, when the fourth National Convention of the Communist Party adopted a resolution which urged the southern provincial governments to begin the process of collectivisation. Following this, in much of the South - with the notable exception of the Mekong delta - rice producing areas underwent a similar process of collectivisation.

Evaluation

In the years preceding reunification the South was producing 7 million tonnes of paddy per year; in the years immediately following reunification, output fell to 6 million tonnes. A comparison of per capita rice output from 1942 to 1986 shows a marked decline in output. In this period, output in Northern regions stagnated at approximately 400 kilograms, while in the Southern regions output declined from 420 kilograms in 1942 to 380 in 1992. In the period 1950-1986 by contrast, per capita output in the Philippines grew by 33 kilograms, and in Indonesia by 110 kilograms.[68]

Faced with falling yields, in 1981 the Vietnamese government introduced a contract system, in which farmers agreed to produce a certain contracted yield for the cooperative, and were allowed to keep the surplus. This change in policy was equivalent to a transition from a fixed wage tenancy to a fixed rent tenancy. There is "substantial and empirical evidence" that improvements in efficiency are attributable to this transition.[69] Following this change in policy, aggregate rice output between 1980 and 1987 grew by 2.5 million tonnes in the South, and in the North by 2 million tonnes.

There was no land tenure security under the cooperative system, and allocations could be redistributed by the management of collectives and party officials. Redistribution was common, and obstructed investments in land necessary to maintain productivity. In 1988 the Central Committee of the Communist Party of Vietnam introduced 10, 15 and 20 year renewable leases for land allocations to avoid corruption and favouritism in the allocation of land at a local party level.

[68] Ibid.
[69] Ibid.

Since 1989, Vietnamese farmers are no longer obliged to sell a contracted proportion of their crop to the government, and instead pay a tax of a certain proportion of their crop which is based on an assessed value of their land. Rice output in Vietnam nevertheless remains low compared with countries with similar agro-climatic conditions. This has been attributed to inadequate policy reform and investment in necessary infrastructure.[70] In 1993 a new Land Law introduced land certificates (land titles) which entitled owners to greater security of tenure.[71] Since the liberalisation of land tenure, there has been a steady growth in output. In the period 2000-2013 Vietnam's rice yield (quintal/hectare) increased by 35.85%.[72]

The collectivisation of land also negatively impacted the condition of Vietnam's forests. During the collectivisation period all land in Vietnam, including forested areas, was nationalised. Nationalised forests were managed by state-owned forest enterprises (SFEs) from the 1960s. Forest cover in the period 1943 to the 1990s declined from 43% to approximately 10-20%. This can be partly attributed to its clearance to make way for agricultural land, but also to the failure of government enterprises to replant logged areas. Partly in response to these problems, there has been a policy transition in Vietnam away from top-down management towards more property-based forms of management.[73] The transferral of some forested areas to private ownership has, it has been claimed, achieved some afforestation. In the period 1990-2004 forested areas have increased by 2,861,000 hectares (31.18%), while forest plantation has increased by 163.5% (1,312,000 hectares). Forest cover in Vietnam has risen from 27.8% in 1990 to 38.8% in 2007.[74] This can be attributed to more extensive re-planting by households which are dependent on small plots of wooded land for fuel and income. Households are also more likely to invest in things such as saplings for the replanting of logged areas when their long-term rights to the land are secure, as would be the case with titled property. SFEs, lacking in such incentives, were probably partly responsible for the process of degradation. An empirical study has calculated that in Vietnam, a household with title to forested land would be expected to plant 700 more trees than a household without.

In summary, the example of Vietnam shows that private tenure of land is often preferable to public or collective ownership, especially where the latter is directed by

[70] Ibid. p.715.
[71] Nguyen, Trung Thanh and Bauer, Siegfried and Holm, Uibrig (2010), "Land Privatization and Afforestation Incentive of Rural Farms in the Northern Uplands of Vietnam". *Journal of Forest Policy and Economics (12).* Available at: http://ssrn.com/abstract=2770386 [Accessed 26.09.2016].
[72] General Statistics Office of Vietnam. Available at: https://www.gso.gov.vn/default_en.aspx?tabid=778 [Accessed 15.09.2016].
[73] Nguyen, Trung Thanh and Bauer, Siegfried and Holm, Uibrig, "Land Privatization and Afforestation Incentive".
[74] Ibid.

government. The process of collectivising rice producing land in much of Vietnam was responsible for the stagnation of output in the North, and the decline in output in the Southern provinces following re-unification. The management of forestry in Vietnam by SFEs was at least partly responsible for the decline in forest cover in the second part of the 20th century. Since the liberalisation of land ownership, and the issuing of land titles, Vietnam's timber stocks have recovered.

Case Study: Ethiopia

In 1975 the Dergist government of Mengistu Haile Mariam abolished the private tenure of land.[75] In much of Ethiopia before 1975, the *rist* system was the predominate form of tenure. This consisted of the communal ownership of land by members of a lineage descended from the original settler of an area. Since the original families settled the area several hundred years ago, and since descent is cognatic and marriage often exogamous, the number of people with rights to *rist* land tended to be large.[76] The division of this land into ever smaller plots was a significant obstacle to the adoption of more efficient farming methods in the pre-communist period. *Rist* land was also frequently redistributed, and disputes would often arise over the construction of permanent structures, which prevented the further redistribution of land considered to be part of the common heritage of the *rist* locality. This had the cumulative effect of discouraging investment in land. The persistence of such tenure arrangements, even before the Mengistu era, arrested Ethiopia's agricultural development.

In addition to communal forms of land tenure, private ownership (freehold) also existed in some parts of the north. Following the Italian occupation, land was assessed for the payment of land taxes, and the receipts farmers received after the payment of these taxes became certificates of private ownership.[77] Land was also managed through a feudal "gult" (fief) system, which included a form of tax farming.[78] Land tenure in Ethiopia in the pre-Dergist period was not, in other words, uniform. This was partially responsible for the underdevelopment of agriculture in the 20th century, and also Ethiopia's vulnerability to famine.

In the period following the Italian occupation a large amount of public land was distributed with formal titles. This accelerated the mechanisation and commercialisation of agriculture, particularly in the final years of the Imperial period.

[75] Kebede, B. (2002). "Land Tenure and Common Pool Resources in Rural Ethiopia: A Study Based on Fifteen Sites." *African Development Review*. 14(1). 113–149. Available: http://onlinelibrary.wiley.com/doi/10.1111/1467-8268.00048/abstract [Accessed 26.09.2016].
[76] Ibid.
[77] Ibid.
[78] Ibid.

Nevertheless, land tenure remained highly heterogeneous throughout the country in the pre-Derg period.

Following the September 1974 coup, the Derg government nationalised all private land with the promulgation of the *Public Ownership of Rural Lands Proclamation*. This redistributed land on the basis of need – with no plot exceeding 10 hectares, confiscated mechanised farms without compensation, and banned the hiring of farm labourers. The new regime established peasant associations responsible for the redistribution of plots. The mortgaging and lease of land were impossible under this system.

The Ethiopian government also attempted collectivization in this period. The formation of cooperatives in Ethiopia was generally not voluntary, and so those involved were compensated by being allocated the most productive land, and through subsidies and access to farming equipment such as tractors and threshers. Farmers who were not members of the cooperatives were forced to contribute labour in times of scarcity. The Mengistu government also embarked on a programme of "villagization", which was intended to relocate much of the rural population to larger villages for the purposes of providing infrastructure, as well as to assist with tax collection and collectivization.[79]

The failure of these policies eventually resulted in the implementation of the "mixed economic policy" in the final year of Mengistu's government in 1990. This prevented peasant associations from redistributing land, and dissolved the cooperatives, providing greater security of tenure and therefore greater incentive to invest.[80]

Evaluation

The scale of Mengistu's "villagization" programme was vast. 5.7 million people were relocated to new villages by 1987, rising to one third of the rural population by 1988. The facilities provided in the new settlements were hugely inadequate. Villages often lacked adequate drainage, with many becoming impassable in the rainy seasons. Following the introduction of the "mixed economic policy" villagers gradually migrated back to their previous localities. Kebede's study found that in all of the sample sites surveyed, the villages created during the programme have since been abandoned.

The agricultural policies of the Derg government did not succeed in increasing output. While Ethiopia had experienced a general decline in both the area of land cultivated and agricultural output from the beginning of 1972, both fell significantly

[79] Ibid.
[80] Ibid.

after the 1974 coup and the 1975 land proclamation, reaching half the 1970/1971 level by 1976/1977, rising slightly after 1981, before stabilising at levels approximate to those in the 1960s. The policies of the Mengistu government were partly responsible for the scope and severity of the 1983-1985 famine. After 1994/1995 and the implementation of the "mixed economic policy", agricultural output and area cultivated doubled. Agricultural production (tonnes per hectare) in Ethiopia rose from just over 1 in 1993/1994 to approximately 2.8 in 2014/2015.[81] Evidence of the extent to which the policies of the Mengistu era retarded Ethiopia's development can be found in the decline in population growth in the 1975-1980 period, which was only 62% of the figure for the period 1970-1975.[82]

In summary, pre-Derg communal solutions, such as the *rist* system, discouraged investment in land due to its frequent redistribution, and therefore contributed to underdevelopment. The progress towards private land ownership and greater security of tenure in Ethiopia was arrested by the 1975 confiscation order, which led to a general deterioration of the condition of land in large parts of the country.[83] The absence of long-term investment, such as in sophisticated irrigation systems, the use of groundwater and modern agricultural equipment is, it has been claimed, "symptomatic of tenure insecurity".[84] Government programmes such as collectivisation and "villagization" have also eroded the rule of law, and created precedents which have promoted state intervention in agriculture at the micro-level.

As with the Vietnam case study, attempts at the top-down reorganisation of land management have proven unsuccessful, as have attempts by both governments to manufacture community driven management strategies, such as cooperatives. Privatisation appears to be the obvious solution for the management of land for which there remains no justification for state ownership. This would entail eliminating CPRs as a means to overcome the tragedy of the commons. This paper therefore recommends that agricultural land, currently held in common, is transferred to private ownership. This is not to say that bottom-up or community driven strategies for the management of resources traditionally held in common do not in many cases represent an alternative to commercial management. Specifically, we recommend that land which effectively operates as a common resource, due to government or "collective" ownership, should be transferred to private ownership.

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[81] United States Department of Agriculture Foreign Agricultural Service. *Commodity Intelligence Report 2015.* Available at: http://pecad.fas.usda.gov/highlights/2015/01/Ethiopia/Index.htm [Accessed 26.09.2016].
[82] The World Bank, "Population Growth". Available at: http://data.worldbank.org/indicator/SP.POP.GROW?locations=ET [Accessed 22.09.2016].
[83] Kebede, B. "Land Tenure and Common Pool Resources in Rural Ethiopia: A Study Based on Fifteen Sites."
[84] Ibid.

II.2.ii Fisheries

Fisheries are perhaps one of the better examples of the tragedy of the commons. Fishing grounds cannot be owned privately, and overexploitation by one or several users would have negative implications for the welfare of the others. This is particularly evident where regulation is lacking, such as in international waters. In several countries, such as Japan and Spain, there have been regulatory regimes in place designed to mitigate these problems for centuries. The decline of fish stocks around the world at various stages in the 20th century has since provided impetus for a more robust system of government-driven regulation. Existing national regulatory regimes vary in complexity and sophistication, levels of self-management and departmental involvement, and success in preventing the overexploitation of fish stocks.

Deep sea fishing resources, which are located in international waters, are not the responsibility of any government, and are subject to few international treaty commitments. Freedom of fishing is also guaranteed under international law. Recent efforts to more effectively regulate this area of fishing are insufficient, and it is possible that examples of successful management at a national level could be extended to international waters.

Overview of fishing in international waters and existing regulatory systems

Current levels of exploitation in deep sea fisheries are unsustainable. It is estimated that two thirds of high sea fish stocks are being exploited beyond sustainable levels.[85] Since 2001 the United Nations' Fish Stocks Agreement (UNFSA) has regulated the exploitation of fish stocks in international waters through Regional Fisheries Management Organisations (RFMOs). Many of these organisations are confined to Exclusive Economic Zones (EEZs). Those which are not regulate the exploitation of two types of fish: those such as cod, halibut and pollock (straddling stocks), whose breeding grounds and populations extend beyond EEZs and into international waters, and migratory fish, such as tuna and swordfish, which move between international waters and EEZs.

For the purposes of regulating international fisheries, the health of fish stocks is assessed by estimating the volume of fish that would be in an area if there was no commercial fishing, a quantity referred to as "unfished biomass", and then estimating the shortfall in actual stock levels. The "maximum sustainable yield" is the optimal shortfall. While a generally useful measure for calculating what are sustainable levels of fishing, it is not perfect. Two species with the same shortfall may be under different

[85] The Economist. "Unbalancing the scales." *The Economist.* 2016. Available at: http://www.economist.com/news/science-and-technology/21702168-poor-management-fisheries-not-local-problem-it-extends-entire. [Accessed 01.09.2016].

levels of pressure from commercial fishing due to different feeding, breeding and migratory patterns. Equally RFMOs do not always act on this information reliably. In 2014 an RFMO, the Inter-American Tropical Tuna Commission, reduced the maximum bluefin tuna catch in its jurisdiction from 5,500 tonnes pa to 3,300 tonnes, when the recommendation from its scientific advisors had been to reduce it to 2,750 tonnes. In 2015 the International Commission for the Conservation of Atlantic Tunas reduced its quota for Atlantic bigeye tuna by 23%, despite the annual catch having already fallen to below the newly approved quota due to its scarcity.[86]

As it stands, RFMOs are the only organisations responsible for regulating fishing in international waters. These cover the majority of commercially relevant species. Efforts to extend regulation to international waters might benefit from the experience of national fisheries management, and recent and innovative developments in policy.

National fisheries management strategies

Fisheries co-management is the sharing of responsibility for fisheries management between user groups (businesses and fishing associations) and governments. Most countries have systems of co-management where stakeholders, such as user groups, are either directly involved with regulating their own industry, or are involved in an advisory capacity. Existing regulatory regimes are highly heterogeneous and have achieved varying levels of success, and may provide some lessons for the regulation of deep sea fishing.[87] The following provides a brief overview of existing fisheries co-management regimes.

In Norway, at both a national and subnational level, fishing groups are represented in an advisory capacity on regulatory councils. Advisors representing types of gear used are appointed by the Fishermans' Union. The councils also have representation from the fish processors association and the union of fish processing workers, and one representative is present from both the Saami Parliament and environmental groups. In those countries which are members of the European Union, policy is conducted at this level. On policy questions, the EU has arrangements whereby industry associations, such as the European Association of Fish Producers' Organizations and Europeche, are consulted. Both these organizations are represented

[86] Ibid.
[87] Pomeroy, R.S., and Fikret, B. (1997). "Two to tango: The role of government in fisheries co-management." Marine Policy. 21(5). 465-480. Available at: http://www.sciencedirect.com/science/article/pii/S0308597X97000171 [Accessed 26.09.2016]

on the EU Advisory Committee for Fisheries.[88] Traditionally user groups in Iceland and the Faroe Islands have played a controversially large role in regulating the industry. More recently, the role of fishing associations has declined.[89] In the United States the Magnuson–Stevens Fishery Conservation and Management Act mandates the participation, through a system of open council meetings, of various stakeholders, which include commercial and recreational users, environmentalists, the seafood processing industry, as well as consumers and interested members of the public. Eight regional councils are responsible for drawing up plans for the management of fishing activity within their respective jurisdictions. During the planning process, open hearings are held in which members of the public may make contributions. The plans when drafted must be sanctioned by the federal government. In Canada, the management of fisheries is the responsibility of the Fisheries Ministry, though interested parties are often consulted through advisory councils before changes in policy.[90] In Atlantic Canada there is a co-management regime where fishing organisations are involved with regulation. In New Zealand, informally the fishing industry has been very influential in the policy development and fisheries management process. This was part of the reason for New Zealand's introduction of the first individual quota regime, which is generally favoured by the industry.[91]

In some countries, such as Iceland, involvement by user associations is highly institutionalised, while in others, such as Canada, it is more ad hoc. In other cases the industry has such a "forceful voice" in the process that it can be said to control it, such as in Iceland and the Faroe Islands. In most cases participation takes the form of "aggregation" rather than of "integration", which is where interested parties forward demands to responsible bodies, which in turn seek a compromise. Integration on the other hand refers to attempts to form consensus through dialogue.[92]

There is often a perception that more participatory regulatory regimes are used to further private interests. As such, participatory models are often viewed as part of the problem with existing regulation. In response to these concerns, in Iceland and the Faroe Islands industry involvement has been sharply reduced, and in the United States such mechanisms are often the target of accusations of regulatory "capture" by environmentalist groups. Debates about "legitimacy" in this area are nevertheless dependent on personal perspective. The legitimacy of less participatory regulatory regimes might for instance be weakened by the lack of representation, or strengthened

[88] Jentoft, S., and McCay, B. (1995). "User participation in fisheries management: lessons drawn from international experiences". *Marine Policy*. 19 (3). 227-246. Available at: http://www.sciencedirect.com/science/article/pii/0308597X9400010P [Accessed 26.09.2016].
[89] Ibid.
[90] Ibid.
[91] Ibid.
[92] Ibid.

by its ability to "rise above" interest groups and take effective action against threats to fish stocks.[93]

Opportunities for the further development of co-management

While institutions cannot be lifted wholesale from one country and imposed on another regardless of the institutional patterns that have traditionally existed in each country, particular features of different systems and particular institutional principles can be used to make recommendations about the future planning of fisheries management. It is important that we make this point since institutional patterns are usually reflective of the wider patterns that prevail in each country. The corporatist structure of the fisheries management systems in Scandinavia for instance is reflective of similar systems for the regulation of industry or of common-pool resources in other sectors of the economy. Similarly, public hearings in the US are not confined to fisheries management. It is important nonetheless that in developing policies we learn from the experiences of other countries, and existing fisheries management regimes provide plenty of opportunities for mutual learning.

It is clear that any system of fisheries management must have the involvement of relevant stakeholders. At the same time, the principle of public interest demands that we look beyond those involved directly in the fishing industry. It is often for instance the case that quotas are set which reflect the economic interests of the industry, rather than the long-term sustainability of fish stocks. We might therefore learn from co-management systems, such as those in the United States or Norway, where other stakeholders, such as unions, consumers, and interested members of the public, are allowed to participate in the regulatory process.

Evaluation of existing regulatory mechanisms

The "privatisation" of fisheries, or allocation of property rights to fishing companies, is one possible means of improving fisheries management. Vessels would be allocated a particular, possibly tradable share in the Total Allowable Catch (TAC) in a pattern similar to the allocation of emission allowances under emissions trading schemes. Imposing TACs without allocating portions of the catch to individual vessels often produces destructive "races" to land as much of the TAC as possible before the quota is filled and the season closes. Such races have been responsible for gear conflicts and long periods spent at sea, as well as significant ecological damage. Efforts to mitigate such problems, such as by imposing per-trip catch limits, limiting the days that vessels

[93] Ibid.

may spend at sea, and reducing the length of the season, often intensify these "races", and therefore the ecological damage they cause.[94]

The allocation of shares in the TAC to vessels through Individual Fishing Quotas (IFQs) overcomes this problem, since each vessel in a sense owns a portion of the TAC, and therefore doesn't have to compete for it. The Individual Transferable Quota (ITQ) is a development of this mechanism. Under an ITQ regime, catch shares may be bought, sold, and leased.[95] This feature provides greater flexibility, allowing vessels to manage their quota more efficiently, such as by selling catch shares to other vessels if they are not in a position to land the share themselves.

Introducing property rights to shares in fish stocks would overcome the problem of the commons, whilst also providing a means of effectively regulating the exploitation of fish stocks, since the TAC will be based on biomass estimates, and therefore ecological realities. Therefore, while further research will obviously needed to assess the ecological impact of catch share systems, this paper recommends that regulatory mechanisms such as ITQs, which seek to introduce property rights to fisheries, are considered seriously by policymakers as a means to promote sustainable fishing.

[94] Griffith, D.R. (2008). "The Ecological Implications of Individual Fishing Quotas and Harvest Cooperatives". *Frontiers in Ecology and the Environment*. 6(4). 191-198. Available at: http://onlinelibrary.wiley.com/doi/10.1890/050060/abstract [Accessed 26.09.2016].
[95] Davidse, W.P., McEwan L.V., Vestergaard, N. (1999). "Property rights in fishing: from state property towards private property: A case study of three EU countries". *Marine Policy*. 23 (6). 537-547. Available at: http://www.sciencedirect.com/science/article/pii/S0308597X98000396 [Accessed 26.09.2016].

III. Recommendations

'Simultaneous' ownership and privatisation

A system of 'simultaneous' ownership and privatization should be implemented by the state in collaboration with local communities, such that the state retains the ability to regulate CPRs but local communities coordinate among themselves and within themselves to manage them (e.g. management of production).

- *There are mutual benefits to this relationship: a guarantee of stable control and retention of CPRs for the state, and rewards to be gained by taking responsibility for these CPRs by local communities.*
- *This system can be adapted to fit different CPRs and different forms of government.*

A key debate in this paper has been concerned with the public/private ownership dilemma, specifically as argued respectively by Hardin and Ovetz. With regard to specific CPRs, certain structures of regulation and monitoring are more effective than others. Given the example of unsuccessful efforts to introduce collective or cooperative systems of management for agricultural land in Vietnam and Ethiopia in the 20th century, for example, this paper confirms the consensus that agricultural land is better managed where there is security of tenure, and the balance of incentives which only private ownership can provide. This paper therefore recommends that titles are issued for government-owned agricultural land, with a view to its eventual transferral to private ownership.

Research of community forestry seems to point towards the benefits of a similar 'simultaneous' ownership solution, where the power of property ownership is combined with local management, allowing the state to regulate common pool resources (in this case, the forest) but communities to manage them. This seems to find a good balance of incentives for all parties involved; the state will not directly involve itself in regulating the forest, confident that local communities will manage the land leased to them in a sustainable manner for their own benefit, as Hardin suggested, but the state retains ultimate regulating authority, a guarantor against local communities pillaging finite resources as Ovetz feared. There does however remain, as has been discussed elsewhere, a compelling case for the private ownership of forestry (II.2.i) – this paper, however, is interested in taking lessons from the 'simultaneous' systems of agricultural and forestry management and applying them to the management of other CPRs.

In *The Origins of Political Order,* Fukuyama notes how in traditional societies,

property rights were regarded in a different way; more of a right to usage than ownership itself, with land and property instead being regarded as the property of past, present and future kinship networks: "the owner is not an individual landlord, but a community of living and dead kin."[96] As such, the living merely own the land in a fleeting sense, like a share, and so in truth they possess the right to use, a subtle difference. This way of thinking about property ownership is seemingly present here, with the neither the state nor the local community strictly owning property in the traditional sense, but with both access and sustainability both guaranteed nonetheless. This is significant in providing CPR policy with a dual framework of being both for the people and managed by the people; this has ramifications for the state as not only a regulator of resources but an enabler of the effective management of these resources on the part of local communities.

The 'simultaneous' ownership solution may be seen to posit a situation in which the state is the landlord and the communities are the renters. However, if instead of picturing this relationship as one of bureaucratic management and of alienation of authority – that is, of a binary between a state that is in control of CPRs and the people who are subject to the effects of this control – one instead focuses on the mutual benefits of the relationship, this 'simultaneous' middle ground offers a potentially good solution to common pool resource management dilemmas. In this framework, the state has ultimate authority over the resources at hand, however, local communities have the responsibility as well as the self-interest to ensure that they are managed sustainably, because they benefit off these resources.

Research suggests that 'simultaneous' ownership is likely to be a more appropriate and feasible solution to CPR management in countries that are more open to the idea of inclusive and shared ownership or resources between the state and the population, and/or in countries with states that lack the capacity to bear the bulk of the burden of CPR management. For instance, in the case of forest management in Nepal, it was due to the state's lack of capacity to manage the forests that they passed the Forest Law (simultaneous ownership in practise), which may suggest that this strategy may not be an obvious choice for stronger states. A 'simultaneous' ownership structure that welcomes local management of CPRs may even be opposed by states that are more politically centralised, such as China, where state ownership is crucial to the power and stability of the state. Thus, it is reasonable to expect that states that are more politically and economically inclusive (to use Acemoglu and Robinson's terms[97]) would be more

[96] Fukuyama, F. (2011). *The Origins of Political Order.* (New York: Farrah, Straus and Giroux).
[97] Acemoglu, D., and J.A. Robinson. 2012. *Why Nations Fail: The Origins of Power, Prosperity and Poverty,* (New York: Crown).

receptive to 'simultaneous' ownership.

This does not mean, however, that simultaneous ownership should remain an aspiration of only a particular type of state. China's One Belt, One Road (OBOR) initiative, which encourages industrial companies and manufacturers to engage in operations in countries along the historical Silk Road, is an example of how this model can be adapted to different contexts. OBOR, announced in 2013, intends to promote economic cooperation and strengthen political relations among countries along the historical Silk Road. One of its major underlying imperatives is to regulate China's domestic overcapacity and its negative externalities, namely pollution and oversupply, by effectively 'offloading' them to other countries. As Zhou, Hallding and Han have highlighted, the OBOR initiative risks repeating many of the environmentally harmful mistakes made at home, such as deforestation and the pollution of groundwater sources, with the only difference being the geographical location in which these faults are committed[98]. In order to avoid this predicament, it may fall to the hands of those countries which choose to accept the entrance of these Chinese state-owned industrial companies to advocate the sustainable management of CPRs in earnest via 'simultaneous' ownership – that is, ownership of environmental responsibility on the part of China and the participating nation, as well as the specific communities (cities, towns) involved

As such, this paper recommends that further research into this management / ownership dynamic should be made, particularly in looking to identify how it can be adapted to different state structures and inter-state structures, as well as a continued watchful eye on the existing case studies to judge their nuances, successes, and weaknesses in the long-term. Moreover, there needs to be additional inquiry into the ways in which the effectiveness of such management techniques can be measured, in terms of environmental and social impact.

[98] Zhou, Hallding & Han. "The trouble with China's 'One Belt One Road' strategy." *Stockholm Environment Institute*. 2015. Available at: https://www.chinadialogue.net/article/show/single/en/8001-The-trouble-with-China-s-One-Belt-One-Road-strategy [Accessed 26.09.2016].

Empower and support local communities in taking ownership of and responsibility for sustainable CPR projects

The empowerment of local communities and their knowledge systems is an effective way of ensuring bottom-up responsiveness to CPR management policies.

- *It also has the benefit of providing the state with accurate information about the state of resources, allowing policymaking to be well-informed of the situation on the ground.*
- *This may take place through the decentralization of certain aspects of CPR management to the local level.*

Having explored the difficulties experienced by Settle Hydro, an obvious recommendation seems to point towards finding a safe way of lifting inappropriately parochial bureaucratic, financial and regulatory restrictions, particularly those existing at the level of local government, in order to allow local CPR management projects to flourish. Keeping in mind, however, the need for administrative structures to continue to exist in order to allow for efficient top-down management strategies, it is important to redirect our attention to the potential for local community engagement as a means of resource management. In particular, in line with the ecofeminist perspectives outlined at the beginning of this report, there appears to be a need to promote the development of local knowledge systems that will more allow communities to take ownership of their own resources – in short, there needs to be a promotion of rights-based approaches to environmental ownership.

In recent years, indigenous and traditional knowledge and local knowledge systems have become increasingly recognized as key ways in which people can exercise their right to self-determine their own cultural values within political and economic systems[99]. It has furthermore been argued that agricultural development efforts in particular should support "the practical integration of different knowledge systems in various areas and sectors [...] to reach the sustainable development goals of a happier and healthier humanity and global environment"[100], given that it is often only through access to such knowledge systems that the four pillars of food security can be identified and acted upon: availability, access, utilization, and stability. This corroborates this paper's previous discussion of the successes of Stroud Community Agriculture in the Cotswolds and of Temple-Wilton Community Farm in the USA, which depend largely

[99] Treakle, J. and Krell, R., "Territorial Development and Local Knowledge Systems: Engaging local farming knowledge through a right-based approach to agricultural development". *Food and Agriculture Organization of the United Nations.* (2014). Available at: http://www.fao.org/3/a-mk953e.pdf [Accessed 22.9.16].
[100] Ibid.

on the ability of those communities to act upon accurate knowledge of their own agricultural production, and to adapt to environmental changes (such as changes in harvests).

This report argues, however, that such initiatives of empowerment should be undertaken not just in terms of management of land and agricultural production, but also of forests, energy, and other common-pool resources. There are two fundamental reasons for this: the first, as described above, is based on pragmatism – local knowledge systems enable policymakers to understand and act upon the needs of particular communities, while taking into consideration the wealth of knowledge that those communities have in terms of practical implementation of policies. Secondly, and perhaps more importantly, empowering communities to take ownership of and responsibility for their own resources in their own terms, that is, based on their own knowledge system, provides a compelling incentive for them to remain invested in their resources. It moreover ensures that common-pool resources remain just that – common, or shared, by all, on an equal and equitable basis: in light of the criticism lodged against previous environmental initiatives undertaken by large non-governmental and governmental organizations that have had the counterproductive effect of not only destroying the environment but also negatively impacting the livelihoods of people living in intimate and direct interdependence with natural systems, the channeling and championing of local knowledge appears even more important on the grounds of ethical responsibility[101]. Moreover, empowerment of communities is also a form of incentivization; enabling people to become invested in the management of their own resources is a key way in which environmental initiatives can be made to have lasting positive impacts.

Although such a recommendation may appear difficult to implement in practice, it is not without precedent. At the Global Land Forum 2013, on the topic of "Inclusive and Sustainable Territorial Governance for Food Security: Sharing Lessons from Around the World", the 273 members of the International Land Coalition as well as the FAO asserted in the Antigua Declaration that:

> "We will support models of development and environmental stewardship based on respect for territorial governance and local food and natural resource management systems"[102].

[101] Ibid.
[102] Ibid.

Applied to a more general CPR context, it appears likely that such a move toward people-centered management will continue, as the advantages of such an approach are increasingly brought to light, and old models of development are abandoned. To the end of such community-based management, however, there are specific prerequisites that must be achieved, including but not limited to the creation or improvement upon of environments so that those communities that are most vulnerable, such as the rural poor, are able to access resources, services, institutions, and policy processes that will allow them to voice their concerns and achieve mobility, and the enhancement of horizontal dialogue mechanisms between the private sector, the government, and community members.

In the long run, the democratization of the process of CPR management through promotion of local knowledge systems, although difficult to achieve, is one that will be much more effective in ensuring uptake and sustainability of community initiatives. This may take place in multiple ways, from a greater institutional recognition of the extreme value local people can place in such projects, to a more technical reform of bureaucratic processing and over-regulation that makes beginning such projects technically difficult. This could have the spillover effect of enhancing small and local communities' social and political autonomy, as they are made to take leadership of their own physical environment.

There is already a rich history of governments subsidising environmental projects; but contrary to making this shift about incentivization through profit maximisation, it could instead emerge from collaborative identification of and provision for local needs. This is in line with Ostrom's argument that it is only through the cooperation of multiple levels of cooperation between institutions – government agencies, user groups, and private actors – at multiple scales and in diverse ways, that effective CPR management can be undertaken.

Future for property rights in fisheries, and the extension of national management strategies to the regulation of deep sea fishing

Integrative national management strategies should be applied to global fisheries management.

- *However, it is also increasingly important for these strategies to be responsive to third party involvement, particular with regard to data collection.*

While the introduction of emissions trading schemes have not been uncontroversial, they represent a pragmatic and innovative means of limiting emissions, while overcoming the problems associated with more prescriptive "command and control" regulation. Similarly, Individual Fishing Quotas (IFQs) overcome the problem of the commons by privatising shares of the volume of biomass which can be sustainably caught. Individual Transferable Quotas (ITQs) furthermore provide a more flexible, market-based alternative to other catch share arrangements, and are in many cases associated with improving fish stocks.[103] While such mechanisms clearly represent an opportunity, it must be noted that IFQs are not an answer to all of the ecological problems associated with fishing, and other strategies, such as Marine Protected Areas and gear restrictions, may be also necessary.[104]

While co-management strategies present in many countries are often the product of demands and conditions specific to those countries, existing national fishery management strategies provide some opportunities for mutual learning. The more integrative management systems are generally those which are more institutionalised. Where the relationship between user groups and regulatory agencies remains informal, the dialogue between them is often one of forwarding demands or instructions from one to the other. More participatory models of co-management, such as that in the United States, with its open hearings, have obvious advantages in terms of their function in aggregating information from various concerned parties.

Co-management systems in national regulatory regimes may provide some lessons for the recent expansion of international efforts to manage deep sea fisheries. While RFMOs inevitably feature elements of co-management, this is often at best semi-formal. Norway and the United States provide examples of developed systems of co-management in which third party involvement is encouraged. Greater involvement from third party organisations, such as NGOs and environmental groups, would improve accountability in an area of regulation which few people are familiar with. There would be obvious difficulties in extending this to an international level; a

[103] Griffith, D.R. "The Ecological Implications of Individual Fishing Quotas and Harvest Cooperatives".
[104] p.195.

criticism of more participatory systems, such as that in the United States, is often that the process is highly time consuming. Involvement by third party organisations from the various countries represented in RFMOs would only magnify this problem. Such systems nevertheless provide a possible model for the future extension of deep sea fisheries regulation.

The future of CPR management lies in whichever strategy can be better tailored to the CPR at hand.

While this statement may sound tautological, case studies by Altrichter and Basurto and Wade highlight the importance of putting essential factors such as the mobility, renewability and necessity of the CPR at the core of any strategy. While it is difficult to generalise whether state-level or community-based, top-down or bottom-up solutions are better placed to attend to these factors, it is probable that the incentive, interest and capacity to effectively follow through with CPR management plans may be more likely found in certain groups than in others.

The importance of situational context is supported by the research on community forestry management, which notes how there are different advantages for both household and corporate interests. This paper has already acknowledged Wade's factors that point to the likelihood of CPR management being successful: resources, technology, the nature of the user group and its relationships with CPRs and with the state, and the degree of noticeability of freeriders.[105] In addition, the success of such projects is very dependent on attributes of the user groups, the government, and the relations between them[106], as well as the situation and skills of those involved (e.g. the legalities of landownership, technology, knowledge, organisational capacity, funding and illegal loggers all affect community forestry[107]).

For example, when the state places the management of forest areas into the hands of local communities, this will only be successful if the local community possesses, or rather, is able to harness, the necessary knowledge and skills to manage the area independent of centralised coordination, while it may prove unnecessary in cases where a stronger state possesses the qualities to regulate the forest more effectively (although it should be noted that conservation for conservation's sake forfeits benefits for the people also). Alternatively, a local energy project like Settle Hydro owes much of its success to pre-developed infrastructure such as the national grid, just as harnessing the power of some sustainable energy resources is dependent on technical knowhow, infrastructure and ecosystem conditions.

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[105] Wade, R. (1987). The management of common property resources: collective action as an alternative to privatisation or state regulation. *Cambridge Journal of Economics*, 11, 95-106. Available at: http://www2.econ.iastate.edu/classes/tsc220/hallam/CommonPropertyResourcesWade.pdf [Accessed 26.09.2016].

[106] Nagendra, H. "Going Beyond Panaceas Special Feature: Drivers of reforestation in human-dominated forests."

[107] Hajjar, R, McGrath, D.G., Kozak, R.A. and Innes, J.L. "Framing community forestry challenges with a broader lens".

As Nagendra notes, problems with conservation and development programs often arise when they are treated by policy planners as "standardised 'blueprint' plans that can be quickly extended across multiple regions, without paying attention to social, institutional, economic, or ecological variability"[108]. Consequently, this paper acknowledges the limits of its own intentions. By studying common-pool resource management in a variety of scenarios, it emerges that the future of common-pool resource management may not necessarily lie in local solutions, but nor does it necessarily not. Indeed, this paper has made different conclusions and recommendations for the management of agriculture, forestry, and fisheries, which are all CPRs but highly distinct. What is key is to identify the specific characteristics of each context in which CPRs are present, and to address those characteristics individually.

Ultimately, one might say that we cannot definitively judge whether the future of common pool resource management necessarily lies in local solutions because each ecosystem, community, and common pool resource has its own interdependent and unique qualities. Such an evaluation would have to be highly tailored to a specific context, in which all stakeholders and the nature of the common pool resources are identified. What remains important, regardless of particular contexts, is thorough consideration of how both local and top-down efforts can support one another in resolving CPR management issues – how state bodies and local community bodies can cooperate in ensuring that common-pool resources are used effectively and sustainably.

[108] Ibid.

IV. Conclusion

This paper has explored the question of whether the future of common-pool resource management lies in local solutions, or whether traditional top-down methods remain the more advantageous option. Taking findings from international case studies in the domains of agriculture, forestry, energy, land, and energy management, it has suggested four core recommendations: simultaneous ownership, community empowerment, participatory co-management of national fisheries, and tailor-made strategies for specific CPRs in different contexts.

Ultimately, this exploration has been practically useful in demonstrating that while decisions about CPR management always necessarily involve complex social, political, and economic considerations, they also provide a space in which innovation and cooperation can flourish, to the end of more effective, environmentally sustainable distribution of resources. The key takeaway from this paper is that policymakers, when thinking about environmental resource management, must focus their efforts on understanding the locus in which local communities and national governments interact. There is no one-size-fits-all answer to CPR management; but the answer most certainly lies in the re-conceptualization of management as collaboration.

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