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Analysis

Co-managing common-pool resources: Do formal rules have to be adapted to traditional ecological norms?

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ABSTRACT

We examine the effectiveness of three democratically chosen rules that alleviate the coordination and cooperation problems inherent in collectively managed common-pool resources. In particular we investigate how rule effectiveness and rule compliance depend on the prevailing local norms and ecological values held by resource users. For this purpose, we employ a framed field experiment that is based on a rangeland model for semi-arid regions and carried out with communal farmers in Namibia and South Africa. Participants could vote for three 'best practice' management rules found in many places around the world that are discussed for implementation in the study area: (temporary) private property rights, rotational grazing or limitation of livestock numbers. All rules were designed in a way that facilitated cooperation or coordination of actions. The focus of this study lies on the interactions between these rules and prevalent ecological norms exhibited in the rounds prior to rule implementation. In contrast to previous lab experimental studies, we find that democratic voting of rules is not sufficient for high rule compliance and an overall enhancement in cooperation. Rules turned out to be inefficient if they were in conflict with the prevalent ecological norm.

1. Introduction

Over-exploitation of common-pool resources is a major concern worldwide, and the introduction of formal rules is frequently discussed as a means to prevent further degradation. Empirical studies suggest that the acceptance of (and performance under) new rules designed to alleviate collective action problems can be strongly affected by the implementation process. Dietz et al. (2003) for instance, demonstrate that top-down policies that grant resource users only very little autonomy tend to fail in managing inshore fishing grounds. Bardhan (2000) analyses forty-eight irrigation systems in India and finds that the quality of maintenance is lower when farmers have the perception that a local elite had made the rules. By contrast, a positive attitude towards water allocation systems and high rule compliance is reported amongst those farmers who responded that the rules have been crafted by the community. Sekher (2000) reports similar results for forest management in India and Yoder (1994) and Lam (1998) for irrigation systems designed and governed by farmers in Nepal. In line with these results, laboratory experiments conducted with Western university students demonstrate that rules implemented according to democratic principles are more likely to stimulate cooperative behaviour and rule obedience as compared to the same rule implemented exogenously, i.e. by external agents (see e.g. Dal Bo et al., 2010; Decker et al., 2003; Ertan et al., 2009; Kroll et al., 2007; Ostrom et al., 1992; Sutter et al., 2010; Tyran and Feld, 2006; Walker et al., 2000).

Little attention in the empirical research on the impact of rules designed to alleviate collective problems, however, has been paid to the interactions between formal rules and prevalent local norms. Since most (if not all) rules can be understood as incomplete contracts that are imperfectly enforced, prevalent norms play a crucial role for compliance. Ellickson (1994) showed that dispute resolution, rule formation, and enforcement amongst cattle breeder and grain growers are provided by norms instead of the external institutions of the county government. Ellickson points out that people face transaction costs of learning the law such that there is little use in governments issuing new laws, and actors will ignore them anyway. Another viewpoint is put forward by Hayek (1974) who argued that a central planner does not have the relevant knowledge in order to purposefully decide and

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plan what is best for the actors (Hayek called the constructivist temptation to create governmental laws, "the pretension of knowledge"). Both Ellickson's and Hayek's analyses thus emphasize the strength of local norms and decentralized solutions vis-à-vis centralized legislations. One prominent example where homegrown norms and external institutions often clash is the planning of institutional interventions both in the context of government policy making as well as of development projects. For example in aid programs donors require "best practice" procedures to be implemented by the recipients without adapting these "best practices" to the homegrown norms and institutions in the recipient country. In many cases the donor hopes that the best practice rule or procedure will later become the norm. However, this planning of interventions often is not successful. As Easterly (2006) points out "searchers", both economic and political, who explore solutions by trial and error, get feedback on the solutions that work, and then expand the ones that work, all of this in an unplanned, spontaneous way. Similar "best practice" blueprints also exist for the co-management of common-pool resources. Co-management is different from purely 'top-down' and 'self-organized' management approaches and combines the comparative advantages of communities and the government. Enforcement of the rules as well as technical and financial support is typically provided by the government whilst resource users democratically decide on the policies or set of rules they want to have implemented. In this paper we analyse how democratically elected blueprints rules interact with traditional ecological norms of real life common-pool resource (CPR) users.[1] According to the norm-activation theory in psychology (Schwartz, 1977), an important precursor to pro-environmental behaviour is the activation of a personal moral norm. This activation takes place in our setting when the individual is aware of environmental problems and values nature per se, other humans' well-being or his own well-being. In particular, we address the following questions: Given imperfect rule enforcement of the government, is democratic rule choice itself sufficient to enhance cooperation and high rule compliance amongst users? Are democratically implemented rules effective in all environments or is their effectiveness dependent on local (ecological) norms?

Our experiments were conducted in villages in southern Namibia (Berseba constituency in the Karas region) and northern South Africa (Namaqualand in the Northern Cape province) where the majority of residents depend on livestock production on communal rangelands managed under common-property regimes. The population belongs to the Nama ethnicity. The experimental design is adopted from Janssen and Anderies (2011) and framed according to the ecological conditions of rangelands in semi-arid areas.[2] Framing the decision situation as a rangeland management problem can be important in order to stimulate norm driven daily-life behaviour within the experiment. The design and payoff structure of the experiment reflect typical ecological features of the study sites, such as path-dependence of previous use, non-linearity of payoffs and spatial resource variability. In contrast to most other CPR experiments, which typically use a context-free design and focus on extraction decision and hence cooperation problems only, our design allows us to study resource users' willingness to cooperate as well as their ability to coordinate actions. That cooperation is not the only underlying motivational factor for CPR users was shown by Fehr and Leibbrandt (2011), who disentangled social preferences and time preferences as two independent predictors of real world behaviour of commons users. However, because there is no policy that can "increase" the share of people with pro-social or time preferences, experiments designed to measure preferences can only be the first step in order to design institutions for real life CPR problems.[3] The functioning of institutions and rules crucially hinges on aspects of group dynamics (status seeking, reputation, peer pressure, etc.) and context information transmitted through framing (which 'activates' the ecological norm) that are deliberately excluded from the design of standard experiments that measure generalizable social preferences. Our study also distinguishes from previous ones regarding the kind of rules that are employed. In contrast to related experimental studies that examine the impact of rather abstract institutions for norm enforcement, like peer-punishment,[4] we consider three management rules (*lottery*, *rotation*, and *quota*) that have been applied in real life in various countries around the world to govern common-pool resources.

As a measure for local (ecological) norms, we analyse the behavioural patterns exhibited in the rounds prior to rule introduction and assume that people who tend to forgo profits in order to maintain grazing availability have strong ecological norms.[5] We observe strong differences amongst individuals and groups regarding their willingness to forgo profits. These differences become particularly apparent in situations of asymmetric resource availability, which constitute critical points in our experiment because groups face the threat of getting trapped in a situation of low resource availability for several future rounds. Groups characterized by a large fraction of members being willing to forgo profits in these situations are called *high sustainability groups*, whereas groups in which selfish short-term profit considerations seem to predominate are called *low sustainability* groups. The distinction between *high* and *low sustainability* groups is used to investigate the interactions between rules and prevalent ecological norms on group level.

To summarize our results, we find that democratically implemented rules do not per se enhance cooperation and social efficiency. Only the quota rule has a significant positive impact on resource availability in both *high* and in *low sustainability* groups. By contrast, the rotation rule only works well for *low sustainability* groups, which suffered from cooperation and coordination problems in the rounds prior to rule implementation. *High sustainability* groups, on the other hand, frequently violate the rule and eventually fail in improving their performance. Our analysis suggests that the high occurrence of rule disobedience in these groups is largely due to a conflict between the behavioural patterns prescribed by the rotation rule and prevalent ecological norms. Thus, the effectiveness of formal rules, even if democratically elected, can strongly depend on its reconcilability with ecological norms held by CPR users.

2. The experiment

2.1. Experimental design

An experimental session consisted of five players and was subdivided into two stages, each lasting ten rounds. The group composition remained unchanged through the session (*fixed matching*). In the no-rule stage, i.e. the first ten rounds, no rules were in place. After the

[1] We define an ecological norm as a personal norm based on one's own moral obligation to protect the threatened environment. The personal ecological norm builds on both ecocentric and anthropocentric environmental values. Ecocentric values represent the belief that the ecosystem should be protected for its intrinsic value, while anthropocentric values represent the belief that the environment needs protection because of its contribution to human welfare. Our ecological norm is distinct from these pro-environmental values as the latter are not sufficient to form pro-environmental behavior (Pieters et al., 1998). One reason may be that the choice between acting in a pro-environmental way and not doing so often involves a conflict between immediate individual and long-term collective interests.

[2] The original experiments of Janssen and Anderies (2011) are fishery games conducted with fishermen from Colombia and Thailand. Some of their results are also reported in Castillo et al. (2011).

[3] It is also neglected that not all studies using simple experiments have high external validity (Voors et al., 2012) especially without interpreting the data within the context of local norms and traditions (Tracer (2003) or Vollan (2012)).

[4] An exception is the study by Casari and Plott (2003), who test the efficiency of a punishment institution that was employed for centuries by CPR users in the Alps.

[5] Using revealed behaviour as a measure for the prevalence of ecological norms has the advantage that we do not exclusively need to rely on hypothetical interviews or questionnaire items about attitudes and motives, degree of 'oughtness' or cognitive beliefs.