HOW TO CATCH A SEAL? THE STUDY OF RATIONAL NORMS OF 19TH CENTURY ISLAND COMMUNITIES IN WESTERN COAST OF ESTONIA[1]

KAIRE PÕDER
PhD candidate, Tallinn University of Technology (TTÜ) and lecturer ofeconomics.
MA, Department of Political Science CEU in 2005; MA, in Economics from TTÜ in 2002.
kaire.poder@ebs.ee

Abstract

This paper states that small communities are able to solve the tragedy of the commons by consent over social norms which change the structure of social trap games. I argue that social traps, which are caused by rational human behavior, thus have informal institutional solutions. I show that individual benefits from cooperation and costs of enforcement of social norms are dependent on group size – community management can be effective when the community is small. The discrete cut which divides communities into small and large is between 50-400 players. My cases are communities which are situated on the islands and islets on the western coast of Estonia. The analytic narratives, composed by using historical material from 19th century until the Second World War, indicate that institutional complementarities for effective community management not only avoided social traps, but also differed by communities.

Introduction

Social dilemmas are situations in which individual rationality leads to collective irrationality – everybody is worse off than they might have been otherwise. Thus social dilemmas or traps are interpersonal cooperation problems. The most common examples of social traps are public goods and common pools and in the literature of game theory, the analysis is concentrated around "off-the-shelf" game types where social traps can be characterized by the prisoners' dilemma. The prisoners' dilemma, an infamous game type, shows that individual rationality doesn't have to lead to a Pareto efficient outcome. In the prisoner's dilemma, both players have the dominant strategy not to cooperate, thus individual rationality leads to worse-off outcomes compared to a coordinated outcome. The result has led to the common belief that in these cases there is need for external institutions for coercive coordination. This mainly takes the form of state regulation. The general notion from the literature[2] is that individuals "could achieve little or nothing without the help of government" in the case of provision of public goods like the environment.

However partly distancing ourselves from rational choice literature we can find several contradictions that demonstrate a human ability to cooperate. The different trains of thought are established by experimental psychologists [3] ; game theoretic experiments by Axelrod[4], and group specific studies by Ostrom[5]. All these allies challenge the original dilemmas by relaxing various assumptions of the original problem. First, it sets the relevance of self-regarding individuals under suspicion. Second, it shows the evolution of cooperation as the strategic result. Third, it demonstrates that the human ability to cooperate in communities depends on the ability to set up efficient institutions. All three trains of thought share one important aspect – they are optimistic about the human ability to cooperate. Although the methodological questions need further elaboration, I will rely on a structural approach, showing the human's ability to set up more or less efficient institutions.

I state that common coordination dilemmas, which are caused by rational human behavior, have institutional solutions. I will show that individual benefits from cooperation and costs of enforcement are dependent on group size; community management can be effective only if the community size is relatively small. I will also show that in my cases, the discrete cut that divided communities into two separate leagues is between 50-400 players.

My argument that small communities were able to solve the tragedy of the commons by social norms has the ambition to connect an orthodox rational choice method with interdisciplinary empirical tools building up an analytic narrative. An analytic narrative is a combination of rational choice game theoretic deductive logic and historical-anthropological study. The analytical part of the narrative comes from analysis of choice rules and payoffs of the individuals using rational choice. Bates[6] proposes that "[…] it [analytic narrative] combines analytic tools that are commonly employed in economics and political science with the narrative form, which is more commonly employed in history." Interviews and historical material support the analytic model giving material for an empirical test.

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[1] This article represents an adapted form of the MA Thesis defended at the Department of Political Science in June 2004 (supervisor Balazs Varadi).

[2] Russell Hardin, *Collective Action* (The John Hopkins University Press. Washington, 1982), 15.

[3] For an overview see Peter Brann and Margaret Foddy "Trust and the Consumption of Deteriorating Common Resource," *The Journal of Conflict Resolution,* Vol. 31 No 4 (1987): 615-630 and David Goetze, "Comparing Prisoners' Dilemma, Commons Dilemma, and Public Goods Provision Designs in Laboratory Experiments," *The Journal of Conflict Resolution* Vol. 38 No 1 (1994): 56-86.

[4] Robert Axelrod, *The Evolution of Co-operation.* (London. Penguin Books, 1990/1984).

[5] Elionor Ostrom *Governing the Commons: the Evolution of Institutions for Collective Action* (Cambridge: CUP, 1990).

[6] Robert Bates, Avner Greif, Margaret Levi, Jean-Laurent Rosenthal, Berry Weingast "Introduction" in *Analytic Narratives*. (Princetion University Press, 1998), 10.

My cases come from the end of the 19th century and the beginning of the 20th century. These communities were relatively closed groups, counting from few to several thousand members. These communities were situated on the north-west cost of Estonia. Most distinct communities were situated on the island of Vormsi, the peninsula of Noarootsi, the island of Ruhnu, the islets of Pakris, the islet of Saarnaki, and some other villages on the island Hiiumaa. In history, this had been a Swedish-speaking district. Swedes have lived on the islands and on the shore areas for many centuries, and most of them moved to the coastal areas of Estonia right after 1334. Some islets started to be inhabited later. Almost all Swedish inhabitants from Vormsi, Ruhnu and Pakris left their homes during 1943-1944, being afraid of Soviet occupation. Approximately 8000 Estonian Swedes escaped to Sweden during the Second World War. The last inhabitants left Pakries in 1965 and Saarnaki in 1973.

The contribution of this paper is twofold – first it shows that there are cross cutting differences in the size of community, dividing communities into successful co-operators and unsuccessful ones and second that institutional complementarities for solving coordination dilemmas differed by community, meaning that communities dependent on size had to impose a different mix of informal institutions for community management. These institutions set restrictions on self-interested behavior for the common good. The most common of them were related to fixing the size of community or setting the boundaries for access to common pools. For constructing the argument, the formal framework is given first and further enriched, and it will finally be compared with the findings from the theoretic and empirical literature.

1. The model

Hobbes'[7] statement that "Every man is Enemy to every man, […] and the life of man [in the state of nature] is solitary, poor nasty, brutish and short" is an infamous description of the competitive-conflict environment individual actors create and maintain without institutional limitations. The Hobbesian metaphor describes the problems anthropologically individualistic actors face in a community. Social dilemmas or traps are situations in which individual rationality leads to collective irrationality. In coordination dilemmas, the Pareto dominant action profiles may tacitly be chosen by community members, but if there is no Pareto dominance then uncertainty remains. We will see that structural solutions, which change the payoff profile, can be the efficient result for solving social or coordination traps like the tragedy of the commons or provision of public goods. This game theoretic model is built up and followed by the discussion of possible structural solutions.

[7] Thomas Hobbes, *Leviathan* (Cambridge: CUP, 1991/1651).

Many social traps can be described through incentive problems – well known examples are public goods and common pools. In the first case, the incentive problem of "free riding"[8] will be the result of rational behavior. The statement is supported by Olson's[9] argument of the logic of collective action. According to this logic, the costs of provision are compared with possible benefits. Hence, we are confronted with the prisoners' dilemma; on the large scale of collective contributions, all of us might receive large net benefits if we all contribute, but none of us may have any interest in contributing. We will see that the effect of net benefits and costs of contributing are largely dependent on group size. In the case of commons, where the supplier of the good is usually "Nature," the situation is reversed – everybody has the incentive to use the resource as much as possible, if the provision of this resource is free of charge. The infamous metaphor of the tragedy of the commons is used for showing that over-utilization of resources is an imminent result in the case of common pools. The tree I cut, the fish I catch, the mushrooms I gather are not available to others. Thus the carrying capacity – are there as many high-quality goods left available – is the main concern. If there isas much and as good-quality product left is dependent not only on the replenishment rate of the common resource, but also on the group size utilizing the resource and the behavior of the group members. As Demsetz[10] explains, the smaller the group, the more easily observable is the cost and source of externality, which allows the internalization of externalities with lower costs. The replenishment rate is the natural characteristic of certain good; the group behavior is not the result of some natural law, but choices of the actors. If everybody prefers "using the resources" to "not using the resources" then we find again the prisoners' dilemma to be the best ready-made analytical setup for classifying and structuring the analysis of the tragedy of the commons.

Let us assume that the problem is defined by theprisoners' dilemma, where preference ordering over possible outcomes is determined in alphabetic order $a \succ b \succ c \succ d$ and the Nash equilibrium or the equilibrium of dominant strategies is $(c;c)$, which is Pareto inferior compared to a cooperative payoff profile $(b;b)$. It is evident that in the case of repetitive interactions, not only preference ordering matters but the relative difference between the payoffs also matters. Total benefits for the group are defined by $B(n)$ where

[8] for original source see Paul Samuelson, "The Pure Theory of Public Expenditure," *Review of Economics and Statistics* 36 (1954): 387-89.

[9] Mancur Olson, *The Logic of Collective Action: Public Goods and the Theory of Groups* (Cambridge MA: Harvard University Press, 1965).

[10] Harold Demsetz, "Toward a Theory of Property Rights," *The American Economic Review* Vol 57 No 2 (1967): 347-355.

equal distribution of benefits will grant every agent individual benefit $b(n) = \frac{B(n)}{n}$. We also know that $\frac{d(B(n)/n)}{dn} > 0$ when adding additional individuals will increase the average product of the group and when the group is growing over the point $\frac{d(B(n)/n)}{dn} = 0$, the average product of the group will decrease.

Enforcement of any kind of cooperative arrangement has its costs. If individual rationality does not lead us to cooperative Pareto-superior outcomes, then enforcing these outcomes has certain costs (*E*). We assume the average enforcement costs to be a function of number of players (*n*) and some external parameter (*x*). The characteristics of the enforcement function $e(n, x)$ are, where $\frac{\partial e(n,x)}{\partial n} > 0$ and $\frac{\partial e(n;x)}{\partial x} = const$.

Assuming equal distribution of the costs each member has to share, the enforcement costs per member will be defined by $e(n,x) = \frac{E(n,x)}{n}$. We can set up the enforcement game of creating the institution of internal authority as an extended-form game, where in the first stage players will choose between agreeing (action A) or not agreeing (action ~A) over the enforcement of a cooperative institutional arrangement. Mutual agreement in the first stage will result in a payoff profile $\{b(n) - e(n,x); b(n) - e(n,x)\}$ in case of two players (see figure 1.1), and in a prisoner's dilemma in a case of unilateral or bilateral disagreement. We assume that mutual agreement is a precondition of creating a cooperative arrangement, thus every agent has a veto right.

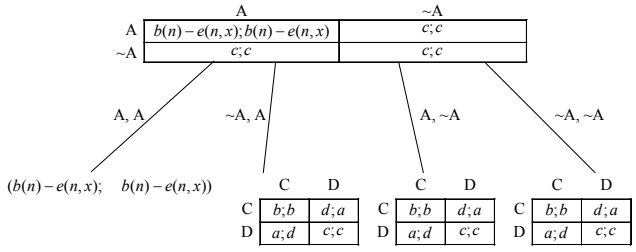

Figure 1-1: Internal authority game

There is one sub-game perfect Nash equilibrium (SGPNE) in this game if $c > b(n) - e(n,x)$, meaning that the average total benefits from cooperation don't exceed Nash equilibrium payoffs. In this case, the agreement over internal authority is not achieved as a self-enforcing result of the internal authority game, and the overall result will stand – communities will fall into social traps. But if

$$c < b(n) - e(n,x), \qquad (1,1)$$

then there are two Nash equilibria and only one SGPNE. In the first stage, all players will choose action A and the game will be over, with the payoffs $b(n) - e(n,x)$ to everybody. The analytical result suggests that agreement over internal authority can be the self-enforcing result, if certain conditions are satisfied. In figure 2.2, the graphical representation of enforcement cost functions and cooperation benefit functions are given. Assuming that condition (1.1) is satisfied, the optimal group size $n^*(e,b)$ can be determined.

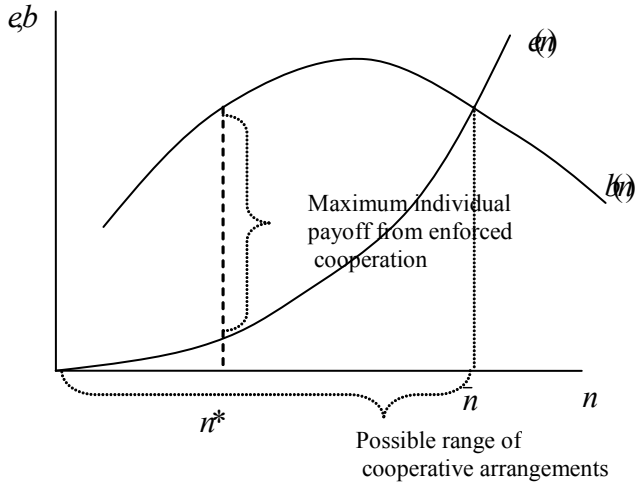

Figure 1-2: Group size and the determinacy of cooperative payoff

In figure 1-2, the possible range of cooperative arrangements is determined assuming $c = 0$. Thus cooperation-enforcing arrangements are self-enforcing solutions to the iterated prisoners' dilemma if the amount of players does not exceed certain level (in figure 1.2 it is indicated by $\bar{n}$). The importance of group size in arranging and enforcing cooperation has been widely discussed by the theoretical train started by Olson[11] and continued by Hardin[12]. Hardin states that:

> The number of people included in the decision unit is crucially important. As the size of a colony approaches 150, individual Hutterites begin to undercontribute from their abilities and overdemand for their needs. The experience of Hutterite communities indicates that below 150 people, the distribution system can be managed by shame; above that approximate number, shame loses its effectiveness[13].

[11] Olson, *The Logic*; Mancur Olson, *The Rise and Decline of Nations: Economic Growth, Stagflation, and Social Rigidities* (New Haven and London. Yale University Press, 1982).

[12] Hardin, *Collective Action*; Russell Hardin, *One for All. The Logic of Group Conflic*. (Princeton University Press: Princeton New Jersey, 1995).

[13] Gerrett Hardin, „The Tragedy of the commons," (www) Http://www.econib.org (The Library of Economics and Liberty 21/12/2004).

For Hardin, cooperation in large groups is questionable because group-coherency is the determinant of cooperation. In large groups, "Nonangelic members will corrupt the angelic" and any cooperation is hard to achieve. In our informal institution game, if condition (1.1) is satisfied the result will not hold, because enforcing cooperation is beneficial to every single player. We saw that in an Olsonian framework group size matters, because any increase in group size will result in the loss of a degree of direct control. Maintaining the control – sharing the costs and benefits equally – is important to our internal authority game as well as for avoiding free riding.

In figure 1.2, the enforcement costs and net benefits from cooperation were represented as the function of the group size *ceteris paribus*. We defined enforcement cost as a function of *n* and *x* , so *e* is dependent not only on group size *n*, but also parameter *x*, which can be defined as the inverse measure of the coherence of the group. The inverse coherence of the group is assumed to be determined by the costs of entry and exit. Thus $x(c_x; c_e)$, where c_x indicates cost of exit and c_e cost of entry. Where $\frac{\partial x}{\partial c_x}, \frac{\partial x}{\partial c_y} < 0$, it means that the costs of enforcement is increasing when a group is less coherent (*x* is relatively large), indicating that there are low costs of exit to and entry from the community.

The question now arises as to where this "rule," which will not allow choosing actions leading to Pareto inefficient outcomes, is coming from? Contractarian tradition starting from Hobbes and Locke has stressed the human ability to cooperate and create more or less alienated forms of agency that will enforce cooperation. Hardin [14] argues that normative social-evolutionary theories justify coercive institutions but do not explain their development. Explanatory evolutionary theories started from Axelrod face relatively similar problems. Even though social ties make most of the interactions in relatively close communities repetitive (which is definitely true in the communities in this study), the evolution of cooperative morals is difficult to explain. Cooperation is the outcome we want to achieve, but "cooperation" will make "defection" the best strategic response. Thus, the institution of penalizing non-cooperation is needed for the enforcement of cooperation. However, cooperation once achieved can be a self-enforcing strategy. If we believe in individual rationality, then in a repeated environment we should also believe in the human ability to develop rational institutions for enforcing cooperation. Arrow states that:

> It is a mistake to limit collective action to state action […] I want to [call] attention to a less visible form of social action: norms of social behavior, including ethical and moral codes. I suggest as one possible interpretation that they are reactions of society to compensate for market failure. It is useful for individuals to have some trust in each other's word. In the absence of trust, it would become very costly to arrange for alternative sanctions and guarantees, and many opportunities for mutually beneficial cooperation would have to be forgone[15].

Believing that rational actors can develop rules as institutions for solving coordination dilemmas is an attitude shared by many authors in the new institutional economics tradition, although in many cases one instead finds that changing circumstances can "lock us in" to inefficient but path dependent institutions[16] because for any kind of cooperation, stable and close relations between the members of the society – "individuals have shared the past and expect to share the future"[17] – are needed. Whether these norms will lead to cooperation or to locked-in defection is the main question of interest. Elster [18] shows that social norms can have multiple functions, and one of them is "to act as a constraint on rationality"[19]. This kind of norm will make cooperation the only possible action by tying our hands. Other types of norms can lower the enforcement costs of cooperation by embedding individual actors into regularities often justified by historical knowledge. These norms can also be called "laws of nature," where communal wisdom leads to aggregate benefits. Norms can also change individual payoffs by incorporating costs of shame or guilt into the game. We will see later that the communities in this study used different mechanisms or norms according to circumstance – ostracizing, hating, "sending away," "tying hands," relying on "laws of nature," etc – for minimizing the costs of enforcement.

2. Empirical evidence

The cases in this study are communities situated on the western coast of Estonia (see appendix 1), and the cases are historical. In table 1, a historical overview of demographics is given. The decision-making units or actors used are farmsteads or heads of the farmsteads, meaning that the size of the community is only an indirect measure of the total number of players. By community, the size of the farmstead differed. In Ruhnu, the extended form of the family was called

[14] Russell Hardin, „Economic Theories of the State," in *Pespectives in Public Choice*, ed D. Mueller (Cambridge: CUP, 1997).

[15] Kenneth Arrow, „Political and Economic Evaluation of Social Effects and Externalities" in *Frontiers of Quantitative Economics* ed M. Intriligator (Amsterdam: North-Holland, 1971), 22.

[16] Douglass North, *Institution, Institutional Change and Economic Performance* (England. Cambridge University Press. 1990).

[17] Ostrom, *Governing the Commons,* 88.

[18] Jon Elster, "Social Norms and Economic Theory," *The Journal of Economic Perspectives* Vol 3 No 4 (1989): 99-117.

[19] Elster "Social Norms", 102.

hiskap, where usually three generations lived together, making the average size of the farmstead approximately 5 members. In Pakris there were together approximately 100 farmsteads. In the bigger communities the number of farmsteads exceeded 400.

Table 1: Approximate number of players and external authority

Community	Number of players	External authority
Hiiumaa	~900	Strong
Noarootsi	~600	Strong
Vormsi	~400	Moderate
Pakries	~100 (in two islands)	Moderate
Ruhnu	~50	No

In Ruhnu and Pakries there were no external institutional constraints on the players; all institutions were internal and rather informal. A complex set of institutions is evident with the people of Ruhnu (similarly in Pakries), which consisted of a mixture of property rights, communal norms, "laws of nature," and internal authority. The group size and lack of external institutions supported by the high costs of exit led this community to a unique basket of institutions for community management. In other cases, Baltic nobility remained the main landowners and the major economic force in the provinces until 1917, even though they lost their exclusive right to ownership of large estates in 1866.

Having stated that the interest is in case specific knowledge – how institutions could solve social traps – I now turn to the analytical part of the paper. Analytic narratives are given to support the deviation of collectives into two categories – large and small communities.

2.1. Efficient community management in Ruhnu

In Ruhnu, due to language, geographical, and technological conditions, the cost of exit from society has been relatively high. Also, we have to take account that in Ruhnu, the most valuable asset of the individual was their freedom from dues to the Baltic landlords. All these particularities increased the cost of exit (c_x) and thus decreased the enforcement costs. The group size was relatively small, indicating that cost of enforcement in this community has been relatively low. The cost of entry, which will also affect the total cost of enforcement, will be discussed. By examining the institution of internal authority in Ruhnu, one can see that internal authority – norms, which were considered to be "laws of nature," ownership structure granting envy free endowments, and agency relationship with the ruler – granted effective enforcement and made collective benefits SGPNE for the players.

Governing institutions in Ruhnu – local village rules called the Law of the Village – had no specific and well-defined written codes. This unwritten code of conduct was mentioned by some available sources[20] as a main institution governing the every-day activities of the people of Ruhnu. This set of regulation didn't only define property rights, the system which has lasted in this original form for at least300 years; it also coordinated all main activities on the island: hunting, boat building, boat laundering, fishing, and community management. There are two interesting aspects of the Law of the Village for the enforcement problem in question – ownership rights and the "democratic" form of community management called *Loandskape*.

Private property rights were as minimal as possible in Ruhnu. Land was so-called semi-private, meaning that *hiskap*s had the right of usage of the land, not the right of selling and buying the property. The division of the land was called the slice system,[21] which gave to each *hiskap* a slice of the land in all possible fields of equal quality. This equalization of initial and final allowance likely created envy-free preconditions in the case of equal manpower per *hiskap*. Even this was more or less achieved. Klein[22] illustrates the relationships of the *hiskaps* by bringing in a letter from 1887 that describes the movement of a son Jakob from Benas *hiskap* to the new *hiskap* of Mass, which in unlikely circumstances stayed without a master.

> Jakob Benas who has moved to Mass, is satisfied with the part he has got, and people of Benas are satisfied with what they have given. Meat is equally distributed by people, also the fish. Five buckets of potatoes were given to Mass at the same day. After this Jakob got his father's fishing-nets. Rye and barney was equally divided and from the seal leathers and foots Jakob got three pairs, he also got one towel, two buckets of malt, two old cows and one young, two old sheep and one young […].

This transcript shows that usage rights instead of property rights applied not only to the land, but also to other valuables – even persons. If some *hiskap* had more "human resources" than others, redistribution of "human resources" was made. Every "human resource" had usage rights on the property according to his functions in *hiskap*. Reallocation of manpower of "human resources" kept the final endowments equal, to create a more or less envy-free community.

We have seen that *hiskap*s had to a great extent given up their rights to a local community –

[20] Gösta Selling, "Eessõna," in *Elu Ruhnul*, ed J. Steffenson (Tallinn: Olion, 1994); Jakob Steffenson, *Elu Ruhnul* (Tallinn: Olion, 1994); Ernst Klein, *Runö* (Sweden: Uppsala, 1924).
[21] Steffenson, *Elu Ruhnul*; Selling, "Eessõna".
[22] Klein, *Runö*.

Loandskape. Klein explains that *Loandskape* is beyond any *hiskap* only when the *hiskap* is endangering the efficiency of community management: "As far as *hiskap* itself can manage well its duties in front of members and neighbours, local community has no rights to interfere to the family management […], but for example if *hiskap* happens to be without a male successor, then local community will decide who will take over the responsibilities of the *hiskap* master, without hurting any other *hiskaps*"[23].

The ownership system of Ruhnu on one hand has some similarities to Polanyi's[24] "world of no greed," where the principles of behavior are primarily associated with reciprocity and equalizing redistribution, but on the other hand social relationships did not dominate over economic or productive relationship; rather the opposite was true. Close social ties were a solution to coordination problems, as will be shown later. Socializing – social claims and assets – was not an overweighting effective coordination reason, because the group sizes for different economic activities differed. Some activities were not governed by norms at all because of difficulties of surveillance, and in these cases individual arrangements dominated. However, in political philosophy, an envy-free society is sometimes considered to be the epitome of the optimal social arrangement;[25] the difference is magnificent between total equalization in Ruhnu and Dworkinian relative prices or market mechanism-based equally valuable holdings. Dworkinian thought experiments justify social insurance in individualistic society; in Ruhnu, we find an envy-free, allocation-based communitarian arrangement, which is a rather rational arrangement in close impersonal exchange societies that maximize collective gains without any trade.

Norms-based management indicates that "laws of nature" are the least costly enforcement mechanisms. It was mentioned by Klein[26] and Steffenson[27] that there was not any kind of surveillance mechanism or bureaucracy present. Similarly to Hobbesian "laws of nature," the basis of these laws was rationality of cooperation. Many times Steffenson stresses that these laws were not god-given, but rather inherited from wise ancestors, which points towards an evolutionary and path dependent institution. There were no sources available about any punishment related to breaking the laws. It was mentioned by Steffenson that the island had a special house which could be called a prison, but this was never used, and finally broke down. Due to the high cost of exit, and as we will see later, the high costs of entry, we may assume that compliance with norms was achieved though social incentives. Social ties were important for enforcing cooperation. The threat of ostracism is definitely an important incentive-creating scheme.

Our players in the small community in Ruhnu had adjusted to the technological, geographical, and natural conditions, creating cooperative institutions for enforcing the cooperation. Due to the high exit and entry cost of the close environment and the small number of players, they had no difficulty in maintaining cooperation as SGPNE. Evolutionary adjustment processes for creating efficient institutions for solving social traps had taken place for centuries. The main determinants of institutions created were the number of players, costs of exit and entry, and technological constraints. These parameters have stayed relatively constant over a long period in history.

2.2. Failures – Hiiumaa and Vormsi

Although in Hiiumaa and also in Vormsi most peasants from previous Swedish settlements were free from serfdom, they rented their land from landlords. Payment was made mostly in the form of money, but in some cases natural rents were also settled. In Saarnaki islet, where exchange transactions were rare, fish rent was paid. In many cases in Vormsi, natural rent was customized as well. In Vormsi, the slice system in ownership of land was abolished already in the middle of 19th century.

Hiiumaa was mainly owned by Duke Ungern-Stenberg. The local masters acted as the agents of the Duke. The Master of Kõpu, Peeter Reikmann, wrote in his memoirs that local masters acted as supervisors and also as a local authority. "[m]y task was to maintain law and order not only on the territory of the manor, but also in the village"[28]. He also describes his duties as the middleman between local renters solving quarrels without engaging official authorities, thus avoiding costs of going to court. This external agency was partially implemented due to historical agency relationships, partly, and I claim, due to players' rationality not to cooperate. To support my claim, I have to rely on historical documents that will shade some light on the community management failures in Hiiumaa and Vormsi.

In the year 1889, Duke Ungern-Stenberg announced to the public (local renters and peasants) that they cannot use lands and forests of the state for cattle herding:

> The forests of Hiiumaa have a lot of detriments due to fires, worms and storms, […] the growing plants have been trembled and eaten by sheep and other animals, after this the sand

[23] Klein, *Runö,*120.
[24] Karl Polanyi, *The Great Transformation . The Political and Economic Origins of Our Time* (Boston: Beacon Press, 1944).
[25] Robert Dworkin, „What is Equality?" *Philosophy and Public Affairs* Vol 10 No 3 (1981).
[26] Klein, *Runö*.
[27] Steffenson, *Elu Ruhnul*.
[28] Peeter Reikmann, „Mälestusi Ungru mõisast," *Läänemaa Muuseumi Toimetised* IV (2000): 113-128.

> and soil will start to curl due to strong winds and, thus the herding in the forest of Suuremõisa and Kõrgesaare is prohibited. […] I let my people to survey and examine that all these who allow animals to walk and eat in the forests, will be punished by the strictest means[29].

This public decree shows that forests under common access were suffering from exploitation and over-utilization, which is a universal feature of common pools under public access. In these areas, approximately 900 families lived, a group size which has a remarkable network size for an impersonal exchange economy. The similar problem with forest management was described in Vormsi by Meikar[30]: "the wood shortage started in the 17th century, which led to the regulation of wood usage – the limits of cutting the forest were established by local landlords, also two forest wardens were assigned. Selling of the forest by peasants was prohibited in 1766." The same source certifies that effective laws and regulations helped and over-utilized forests ceased to exist and starting from the middle of the 19th century, the forest of Vormsi was described as a beautiful pine tope, and the shortage of the wood was considered to be a past experience[31]. This shows that at least in case of the commons in the communities of Vormsi and Hiiumaa, external authority had to set rules and regulations to avoid the trap. Were other social traps also present?

In Vormsi, there is another source available that describes local community relationships before 1873 when priest Lars Österblom was sent to the island to establish religious morality and norms for the people who lived "worse than the animals." Tuttar and Dahl[32] say that according to a local peasant, drinking was the most common coordinated activity. There was no more coordination, but instead there was stealing from others and from the landlords, and beatings and quarrels were common. From the same source, the description of the sources of monetary income explain that in manor corn husking, what lasted throughout the year, all peasant guards and workers stole even more they could carry. During the nights manor forests were stolen and sent to Haapsalu. Similar events are described as folk jokes in the case of Hiiumaa, where local forest warden stole manor wood and let others steal as well[33] or as folk stories such as one told by Ant Peterson in 1875, according to which local peasants were cheating the masters[34].

There were some documents assuring some cooperation between community members, but this cooperation was the consequence of the scarcity of resources rather than effective community management[35]. The first description of local cooperation comes from Vrager[36] who describes the foundation of Kärdla fishermen society in 1898. Similar societies or association were functioning in Noarootsi[37]. In Vormsi from 1880 to 1890 there were almost one or two fishing drag-nets shared by six families in every village. Often boats were also common property. All these collective arrangements in Hiiumaa, Vormsi and Noartootsi were cooperative ventures, sharing the properties of firms. However, the impersonal exchange economy - which decreased the cost of exit by establishing trade relationships and allowed economic relations based on a division of labour - increased the enforcement costs of cooperation. With the population increase in Vormsi, the old norms-based management was quickly abandoned. If we trust the source, then the transformation period from community-based management to an impersonal exchange environment was not smooth. Transformation of the "noble savages" to "individualistic optimisers" had taken place in Vormsi during the second half of the 19th century. I have shown that this break was caused by an increase in group size and evolution of impersonal exchange economy, which allowed individual to function without a supportive network and thus decreased the costs of exit from the society.

In large groups, community management failed because the net benefits from cooperation were small or even negative in the case of enforcement costs in an impersonal exchange environment. Condition (1.1) was not satisfied and the internal authority game thus has only one SGPNE – everybody will "not agree" (~A) during the first stage, which will lead to the "defection" (D) and the equilibrium payoff profile $\{c; c\}$ in the second stage. The narratives have shown that group size may have an impact on the net benefits of cooperation, but we have not been able to show that number of players (n) has a causal relation with the ability to establish cooperative ventures, because in all success cases an impersonal exchange environment was also present, which will diminish coherence of the group and increase parameter x. But we will see that some cooperative arrangements between members of the smaller units, mainly villages or islets (Saarnaki),

[29] Bernhard Tuiskvere "Eesti Metsadest Möödunud Sajandil," *Eesti Mets* 7 (1939).
[30] Toivo Meikar "Vormsi saare metsade ajaloost," *Läänemaa Muuseumi Toimetised* IV (2000): 29-44.
[31] Meikar,"Vormsi Metsadest".
[32] Hendrik Tuttar and Dahl "Ärkamise aeg," *Eesti Baptsisim Ajalugu* I (Tallinn: E.B.K. Seltsi väljaanne, 1929).
[33] Elmar Vrager *Hiiumaa ja Hiidlased: Ülevaade Saarest ja Rahvast* (Toronto: Estoprint, 1971).
[34] Selma Lätt, *Eesti Rahva Naljandid* (Tallinn: Eesti Riiklik Kirjastus, 1957).
[35] Arved Luts, "Mõnda kalandusest Läänemaa randades kuni 1940. aastani," *Läänemaa muuseumi toimetised* III (1999): 89-104.
[36] Vrager, *Hiiumaa*.
[37] Luts, "Kalandusest Läänemaal".

remained customized until the Soviet occupation in 1944.

2.3. Institutions for size management

We have seen that group size is a core characteristic of creating institutions for solving coordination dilemmas. Ostrom[38] and Bardhan[39] have shown that groups often find a way to manage access to common pools, and those arrangements are found to be surprisingly robust. Ostrom proposes that successful communities are marked by clearly-defined boundaries – "Individuals or households who have the rights to withdraw resource units [from the commons] must be clearly defined, as must be the boundaries itself"[40]. Cases collected by Ostrom, such as the village of Töbel in Switzerland, Hirano, Nagaike, and Yamanoka villages in Japan, the city of Valencia, and others, all share fundamental similarities. These similarities include stable membership, close relationships, and interrelated generations. Ostrom also states that "extensive norms have evolved in all of these settings that narrowly define 'proper' behavior [and] the specific operational rules in these cases differ markedly from one another"[41]. The same result – remarkable differences in institutions solving the same difficulties by communities – has also been shown by Richerson[42].

I will consider three different cases where entry conditions were set by different mechanisms. The first case is Saarnaki, an islet with only four families, where the rule of fixing the size was set in quantitative terms – the carrying capacity of the isle was 16 adults. The second case is Ruhnu, where common resources did not meet the carrying capacity, thus access was allowed if and only if the newcomers conformed to local "laws of nature." In the third case, the community members had no authority to setting the boundaries, thus the "institution" of hate and secrecy emerged.

Our first case is Saarnaki (territory of 1.3 square kilometres), which originally belonged to the Duke Ungern-Stenberg, but the people living on the islet considered themselves to be the owners of the islet[43]. The territory of Saarnaki allowed each family to have domestic animals according to their needs, not for taking to the market. In addition to private arable land, common land was divided into private zones. Trespassing was allowed, pastures for grazing the herd were considered to be private, and for effective land management fences were built or child-shepherds kept the animals in their zones. Zones were established also on the coast line, and due to a shortage of wood, every tree trunk or log washed ashore was extremely valuable. Also sea weeds, used for bolstering soft furniture and matrices, were gathered from the coastline, dried, and sent to the mainland, which was an important source of income for locals. "Privatization of the commons" is a well-discussed cooperative arrangement in solving traps,[44] But not all resources could have been privatized – a social network had to be maintained for cooperative activities like fishing, maintaining the forest, and grinding in the windmill. Several resources were also impossible to privatize, like berries, mushrooms, wild birds (like in the case of Ruhnu), and fish. The reasonable argument is that privatization of all commons was not socially reasonable due to the nature of the resources. The size of the islet limited the carrying capacity of the natural resources, so an institution enforcing optimal consumption is the rational response to the natural conditions.

This institution – a rule which fixed the amount of inhabitants – was enforced. In Saarnaki there had been an unwritten law that the carrying capacity of the islet is 16 adults, called "the rule of 16." On the islet there were four families, meaning that in the families there could not be more than four adults, meaning the grownup children had to leave. Taking into account that each family had at least four or more children, the rule setting seemed to be vital for sustaining the quality and quantity of resources left for the next generation.

The second case is again Ruhnu, the island which had developed and maintained a perfectly adjusted network of institutions for community management, and has even more to offer for testing the credibility of my claim. The fact that in Ruhnu nobody was forced to leave the community signals that the carrying capacity of the island was not met. There was no competition between locals and outsiders, indicating that technological constraints and high transaction costs dominated over the scarcity of the resource. Also everybody, including outsiders, had equal rights to hunt, without any division of land or seashore into private zones.

Despite the fact that there were no ill feelings towards outsiders, according to the statistical sources, only five Estonians lived on the island in 1934. According to Steffenson, there was only one Estonian man, who married on the island and had several wives during the first Estonian Republic. Steffenson writes:

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[38] Ostrom, *Governing the Commons*.

[39] Pranab Bardhan, "Analysis of Institutions of Informal Cooperation in Rural Development," *World Development* 21 (4: 1993): 633-39.

[40] Ostrom, *Governing the Commons*, 91.

[41] Ostrom, *Governing the Commons,* 88.

[42] Peter Richerson; Rob Boyd; Brian Paciotti, "An Evolutionary Theory of Commons Management. Draft," in *Institutions Managing the Commons, e*d P. Stern (chap. 3 forthcoming, 2001).

[43] Elmo Saarnak, "Interview by author," tape recording (Estonia, Hiiumaa, Emmaste:2005).

[44] Harold Demsetz, "Toward a Theory of Property Rights," *The American Economic Review* Vol 57 No 2 (1967): 347-355; David Schmidtz "The Institution of Property," *Social Philosophy and Policy* Vol 3 No 4 (1994): 42-62.

> Sometimes it happened that somebody had to marry a girl out of Ruhnu, and then men sailed to other territories, where Estonians lived, to seek for the wife. Only one Estonian man married on the island, he had to live for many years on the island, before he was taken as a part of the community. He had to learn the language and customs before he received "full citizenship" and became a member of the St Magdalena congregation[45].

Compared to wives, husbands had certain social functions as the head of the *hiskap* – participating in village meeting, voting, seal hunting, boat building, and participation in other cooperative arrangements – which demanded not only technical skills but also conformation to the already discussed "laws of nature." Becoming a "citizen" of the Ruhnu and member of *Loandskape*, the collective decision institution, was vital for efficient community management. We call this size management institution "quarantine," which set the norms for newcomers: don't accept outsiders till they conformed.

In the current example, institutions played a different role than in the previous examples. As long as the size of the community is not approaching the size where it can endanger cooperation by increasing the cost of enforcement or lowering the benefits from cooperation, the size of community will not matter in case of marginal changes. In case of marginal changes, it is important for the community to ensure that the newcomer is conforming to existing norms. The institution of quarantine distributes the cost of entry so that it will be carried only by the newcomer, thus maximizing the possible aggregate benefits for the "local" players.

Our third case, Hiiumaa, set up different kinds of "institutions" of hatred and secrecy. Similar dependent "institutions" can be found in many communities from different cultures, social norms, ethnical roots, etc. Cultural evolutionary theorists explain this feature by path dependency. This tribal social instinct hypothesis as a basis of cooperating with insiders and distrusting outsiders is even believed to be built into our genes due to social selective learning which causes these cultural imperatives[46]. Following a similar path, the evolution of cultural symbolically marked groups distinguished by folk costumes or "wearing of common colors" is considered by LeVieil[47], where "colors" stress the difference between insiders and outsiders. Despite many alternative explanations the simplest – hating outsides will not hurt players, but has probabilistic benefits by keeping intruders out – is discussed in this section. These uncertain benefits can be endorsed by informing intruders about the attitudes of the locals. The norms, where the functional role of the community has been the establishment of this difference, are shown by Hardin[48]. He argues that it is inappropriate to call these norms community norms as they are rather "norms of particularism, difference and exclusion"[49]. It is clear that membership can give certain benefits in case of a fixed supply of some natural resources – for example in the case of commons. Also assuming that the community has some preliminary coordinating devices in the form of informal institutions, any new member will threaten the existing comfort, familiarity, or easy communication inside the group.

The other mechanism in "not-so-complex" societies for playing social games is hiding information. The "secret" mushroom gathering places or berry picking places are common to many Estonian communities.

> In other cases, the sea is legally defined as common property, open to all, but various means of restricting access have developed. […] One is secrecy, not making public the information and knowledge necessary to successful exploitation of sea resources[50].

Typically the exploitation of resources or other negative aspects like a worsening social climate "rife with secretiveness, lying, avoidance, and general suspicion"[51] is stressed. Here I argue something different – hiding information could be a norm, a rational behavior to avoid common traps. Information hiding or secrecy can be interpreted as one form of institution that will limit access to public resources and help to solve social traps. In these cases, members of society can accept the norm without harming the social network, but at the same time benefits from limiting access can outweigh social costs.

This work shows that different institutions for governing commons will be developed under different natural and communal conditions. In Saarnaki, where the natural resources were maximally utilized by a small number of players, the vital institution of the "rule of 16," was developed. The main problem of this small community was the internal control of the group size. In Ruhnu, where common resources allowed marginal increase of the users, a different rule – quarantine – was developed. In open access communities, where communities were not able to set boundaries to common

[45] Steffenson, *Elu Ruhnul*, 128.
[46] Richerson et al, "Commons Management".
[47] Dominique LeVieil, . "Territorial Use-Rights in Fishing (Turfs) and the Management of Small Scale Fisheries: The Case of Lake Titicala (Peru)," (Ph.D. diss., University ob British Columbia, 1987).
[48] Hardin, *The Logic of Group Conflict*.
[49] Hardin, *The Logic of Group Conflict,*, 74.
[50] Paul Durrenberger and Gisli Parsson, "Ownership at Sea: Fishing Territories and Access to Sea Resources," *American Ethnologist* Vol 14 No 3 (1987), 510.
[51] Andersen in Durrenberger and Parsson, "Ownership at Sea," 510.

resources, "institutions" of hatred and secrecy developed. These institutionalized attitudes toward outsiders may also be seen as solutions to the management of commons, although it must be admitted that they might have also been socially harming. Although in the case of a fixed supply of natural resources, keeping intruders out is not only individually rational, but also collectively beneficial when we face the tragedy of the commons.

Conclusions

My argument that small communities were able to solve coordination dilemmas by developing different social norms is supported by empirical evidence. I have shown that the most important determinant of cooperative institutions was the size of the group. Group size determines not only the costs of enforcement of cooperative morals, but also the expected cooperative benefits. Other exogenous variables affecting the costs of enforcement are related to group cohesion, which can be indicated by the costs of exit and entry. Table 2 summarizes the case-specific knowledge and clearly indicates that an impersonal exchange relation is not the main cause of failure of effective community management. Instead, impersonal exchange relations decrease the costs of exit and affect the costs of enforcement.

Table 2. Summary

Community	Costs of enforcement (e) dependent on the coherence of the group (x)	Number of players (n)	Effective community management	Impersonal exchange relations
Hiiumaa (in general)	High costs small coherence	~900	-	+
Hiiumaa (specific cases)	Low costs considerable coherence	~30	+	+
Vormsi	Relatively high costs relatively small coherence	~400	-	+ -
Ruhnu	Low costs considerable coherence	~50	+	-
Saarnaki	Low costs high coherence	4	+	-

Thus I suggest that the discrete cut of community size to make community management effective is between 50 and 400 players. In these cases the players were extended families or farmsteads, so the size of the communities is much larger depending on the size of the farmstead. In Ruhnu the effective size of community was below 300 members, and in Hiiumaa and Vormsi, the cases of failure, communities exceeded 2000 members.

A basket of interrelated institutions for effective community management in Ruhnu shows that the enforcement cost of collective action can be embedded into different setups of norms. This coordination "miracle" consisted of institutions of property rights, "laws of nature," and village meeting *loadskape*. The equal distribution of initial endowments and the redistribution of final endowments were the important characteristics for symmetrical representation of benefits. This relatively extraordinary natural experiment shows that institutions do not exist in a vacuum and their complementarities are as important for mutual understanding as single factors. The slice system was effective only when supported by a redistribution of manpower; rules-based community management was only effective in case of equal endowments; and an institution of quarantine was needed only when the rest of the institutions were effectively enforced.

Our failure cases have shown that institutions do not exist in vacuum. External institutions shape individual payoffs through incentive schemes, allowing for the creation of so-called double morality – in-group relations differ considerably from relations between the groups or between the players and external authority. The most valuable finding has been the institutional arrangement which can be called private zones. This partial privatization of common resources was effectively enforced by small groups, although large group common-pool management failed.

I have shown that the size of the community in not exogenous under certain conditions. In all cases, natural boundaries more or less help the communities to increase the costs of entry. However, when size matters, communities were able to develop different institutions for setting up additional boundaries. In the islet of Saarnaki, where natural resources met the carrying capacity, the size of the community was detrimental. The institution of "the rule of 16" was enforced by tacit consent. This institution fixed the maximum number of inhabitants who had access to common pools. In Ruhnu where the scarcity of the resources did not set considerable constraints on the group size, the community management system consisted of a complicated mixture of institutions demanding conformity from newcomers. Thus the institution of quarantine was the optimal evolutionary result, which forced newcomers to conform. In open-access communities, where players were not able to control entry by setting boundaries, different informal norms of "hatred" and "secrecy" were the evolutionary results.

It has also been shown that a personal exchange environment has an important impact on the cost of enforcement of collective arrangements. The lack of a market economy accompanied with redistributive and equalizing mechanisms led to the creation of an envy-free society. Thus Polanyi's "world of no greed"[52] gave

[52] Karl Polanyi, *The Great Transformation. The Political and Economic Origins of Our Time* (Boston: Beacon Press, 1944).

rise to the specific mixture of institutions, but maintaining the high costs of exit and entry made the group coherent. This argument is also supported by Olson's logic about social selective incentives and symmetrical organization[53]. The collection of cases presented by Ostrom shows the successes and failures in common pool management[54]. She stresses the factors which contribute to the probable failure: a large number of farmers, diversity of cultural backgrounds, unequal initial endowments, lack of control, and no affiliation[55]. In the cases presented in this work, it was shown that most preconditions are sustained but the cultural background precondition can be relaxed. Also, the meaning of a large group can be specified by arguing that the cross-cutting difference must be between 50-400 farmers.

It was also shown that some informal institutions do not have to be socially optimal, like in the case of hating outsiders or keeping secrets. However, these are still rational responses in choice-specific situations. North is famous for indicating the threats of being locked in to inefficient but path dependent institutions[56]. Unfortunately the natural experiment examined here does not allow for examination of the sustainability of these institutions. Ruhnu would have had a perfect experimental stage for testing the impact of impersonal exchange relations on existing institutions, but we can only say that the institutional mixture in Ruhnu had marginal changes already during the opening up in the 1920s. Also more information is needed to study the transition period of Vormsi from an impersonal to a personal exchange economy in the middle of the 19th century.

The current study has contributed to the wide range of literature about individuals' ability to cooperate without external coercive enforcement. Two works highlight the issues related to the field. First, Hardin argues that norms and conditional strategies can be possible solutions to social traps without a coercive state[57]. The second argument is that the state destroys the very elements of the community, like common beliefs or norms, direct and complex relationships between members, and reciprocity. I believe that the Aiboland case study, following Hardin's footsteps, shows that complementarities of norms and systems interrelating external and internal institutions can be a fruitful path for further studies. It would be interesting to see the emergence of alternative smaller cooperative formations in case of failure of cooperative large communities, like clans, social groups, or other frameworks. Also, the alternative hypothesis that external authority destroys community norms could be tested further. For the enthusiasts who share the opinion that interdisciplinary studies will enrich the quality and quantity of academic work, the latter should be an encouraging message.

[53] Olson, *The Logic of Collective Action*.
[54] Ostrom, *Governing the Commons*.

[55] Ostrom, *Governing the Commons*, 166.
[56] North, *Institutions*.
[57] Hardin, *Collective Action*; Hardin, *The Logic of Group Conflict*.

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APPENDIX 1: MAP OF THE AREA