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Community Identification Moderating the Impact of Financial Incentives in a Natural Social Dilemma: Water Conservation

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Mark Van Vugt

University of Southampton

Abstract

The moderating role of community identification was investigated in the impact of different tariff systems on domestic water use. Over a nine month interval both consumption and survey data were collected in 278 households in the UK, 203 of which were on a variable tariff (i.e., charges related to use), and 75 on a fixed tariff (i.e., charges unrelated to use). Adopting a social dilemma approach, I expected a fixed tariff to be associated with greater use than a variable tariff, in particular when resources were valuable, and people identified weakly with their community. This hypothesis was supported in both the field study and an experimental study which simulated a natural resource crisis in the laboratory.

Community Identification Moderating the Impact of Financial Incentives in a Natural Social Dilemma: Water Conservation

One of the major challenges for society in the 21st century is to cope with a growing mismatch between the demand for and supply of scarce natural resources, such as land, energy, and water (OECD, 1998). Unless drastic changes in society occur, the call of the Rio Earth Summit for sustainable resource use may well be viewed as a well-intended fantasy rather than a real possibility. Experts agree that long-term policies are necessary to prevent serious shortages, and, in addition to increasing resource supply, these should be aimed at promoting individual restraint (Berk et al., 1980; Gardner & Stern, 1996).

A behavior change might be difficult to achieve, however, because conservation poses a threatening dilemma. While it is in the interests of society to collectively restrain use, individual citizens are better off not to exercise restraint. For example, during a hot and dry summer, households may be tempted to use as much water as is convenient, hoping that sufficient others will make an effort to conserve. However, if most people think this way, water reserves could deplete rapidly, creating a possible water shortage. This conflict between private and public interest is generally known as a social dilemma (Messick & Brewer, 1983; Van Vugt, Snyder, Tyler, & Biel, 2000).[1]

The present research adopts a social dilemma approach to investigate the combined effects of financial incentives (via tariff system) and strength of community identification to promote domestic resource conservation. This research will focus on water conservation as example of a natural social dilemma. Water shortages are regarded as the biggest resource threat for societies worldwide (OECD, 1998).

Additionally, most social-psychological research on conservation has focused on domestic energy use, and water conservation has been a relatively understudied area (for some exceptions, see Aitken et al., 1994; Thompson & Stoutemeyer, 1991; Tyler & Degoey, 1995; Van Vugt & Samuelson, 1999).

Water Conservation as Natural Social Dilemma: Theory and Previous Research

The social-psychological literature generally draws a distinction between two broad classes of strategies to tackle social dilemmas, the structural versus psychological approach (Messick & Brewer, 1983). This distinction can be useful in thinking about ways to promote the conservation of scarce natural resources, such as energy and water.

The structural approach contains strategies that intervene directly in the outcome structure of the dilemma. Their primary aim is to eliminate or, at least, soften the conflict between the self-interest and the collective interest. Disconnecting households from water during a shortage, for example, resolves the social dilemma completely, because people are forced to cooperate. Changes in the tariff structure of water merely soften the conflict between self-interest and the public interest as they can make conservation financially more rewarding. A common example is the installation of domestic water meters, which makes it possible to charge households for the water that they use, rather than charging a fixed rate that is independent of actual use. Such use dependent or variable tariff systems provide thus households with a direct financial incentive to consume less water (Van Vugt & Samuelson, 1999).

The second approach to managing resource dilemmas is social-psychological, and contains interventions altering the way people value and think about the resource.

A typical example are activities to raise public awareness of a resource problem, for example, via the provision of information (Thompson & Stoutemeyer, 1991). Perhaps more promising are social-psychological interventions which use the available social connections between members of a community to promote restraint (Berk et al., 1980). Such community programs may strengthen the social norms associated with conservation, and increase people's commitment and responsibility for the preservation of a local community resource.

In the present research I will investigate how these two approaches, the structural and social-psychological, interplay in promoting water conservation. I am particularly interested in the effects of different tariff structures, and whether their impact is qualified by the strength of people's community ties. From a theoretical viewpoint, this question seems quite relevant, because it could shed some light on the interaction between structural and psychological approaches to solving social dilemmas. Thus far, theorists of social dilemmas have considered these approaches relatively independently from each other.

Yet, recent experimental research has observed an interesting trade-off between structural and psychological solutions, with structural incentives being more effective when social-psychological motives to cooperate were absent. For example, one social dilemma study (Van Vugt & De Cremer, 1999) found that group members whose identification with their group was low cooperated less than high identifying members especially when there were no penalties associated with defection. When there was a threat of punishment, however, low identifiers cooperated as much as high identifiers. Extrapolating this result to the domain of resource conservation, it would suggest that tariff systems in which overuse is penalized are particularly effective when an individual's community identification is low.

From an applied perspective, an integrative perspective on cooperation is important as well, because financial incentive programs by themselves have produced rather unreliable results in promoting sustainable use (Kempton, Darley, & Stern, 1992). In addition to the size of the incentive and the way it is presented (as punishment or reward) the success of an incentive program also depends upon the social-psychological make-up of the population (Samuelson, 1990). Incentive strategies may be particularly influential in communities in which people are not greatly concerned about resource conservation or they have low expectations about the restraint of other community members (Van Vugt & Samuelson, 1999).

Tariff Structure and Water Use: A Personal Motive to Conserve

The primary result of a change in tariff, from a fixed (unmetered) charge to a variable (metered) charge, is that it establishes a relationship between performance and reward in the sense that households are rewarded financially if they consume less water. Based upon theories of motivation and effort (Eisenberger, 1992), one might expect that metering will reduce domestic water use, and, intuitively, this difference should be stable across different periods of the year. Yet, a social dilemma perspective on water conservation suggests that particularly in periods when resources are short, a variable tariff could be more effective in promoting sustainable use than a fixed tariff.

When water reserves are abundant there is no major conflict between the interests of the individual and community. People can use however much they want, and their requests will not affect the communal water reserves in any serious way.

Yet, when resources become short and the need for water rises -- during the summer period, for example -- conflicting pressures are instilled upon people. On the one hand, they should help out their community by restraining their use. On the other hand, they may be tempted to use more before the resource is depleted (Kramer, McClintock & Messick, 1986).

The desire to act selfishly will be affected by the tariff system of water. Under a fixed charge there is no incentive to reduce use. In contrast, under a variable charge households are charged for excessive water use. Accordingly, a social dilemma analysis of water conservation suggests that the difference in use under these two tariff systems is expected to be more pronounced when there is less water available, hence, when there is an increase in tension between people's immediate self-interest and the interest of the community.

Community Identification and Water Use: A Pro-social Motive to Conserve

In addition to selfish motives, resource conservation might also be shaped by particular community concerns. These may derive, for example, from the importance attached to the preservation of a local resource, the desire to be a good member of the community, or simply helping out others to whom one feels connected. Indeed, following a social dilemma approach, the inherent conflict between people's self-interest – to use as much water as one wants – and the collective interest – to exercise restraint – could also be solved by increasing the weight people assign to the collective interest (Kelley & Thibaut, 1978).

A potentially important factor determining the transformation from self-interest to collective interest is the extent to which people identify with their local community. According to social identity theory (Hogg & Abrams, 1988; Tajfel &

Turner, 1986), the strength of group or community identification reflects the psychological attachment of people to their community. Community identification is assumed to induce changes in people's attitudes and behaviors, bringing them closer in line with the needs of the community.

The facilitating role of community identification has been shown in experimental research conducted within the social dilemma tradition. Various small group studies have revealed that, to the extent that people identify more strongly with their group, they are more willing to invest in collective goods and exercise restraint in communal resources (Brewer & Kramer, 1986; De Cremer & Van Vugt, 1999; Kramer & Brewer, 1984). In applied research, little attention has so far been paid to the potential benefits of community identification on resource conservation (for an exception, see Tyler & Degoey, 1995). Thus, it remains to be seen whether these results extend to large-scale social dilemmas, such as water conservation.

What are the mechanisms through which community identification might enhance the willingness to conserve water if there is a resource problem? First, experimental findings suggest that community identification might transform the definition of self-interest to an overarching community interest, thus blurring the boundaries between the private and collective interest (De Cremer & Van Vugt, 1999). Second, greater community identification could also help to promote restraint by increasing trust in other people's willingness to exercise restraint (Kramer & Brewer, 1986). Finally, community identification may raise feelings of pride and respect in the community which may further promote restraint during a shortage (Tyler & Degoey, 1995).

Prediction

Based on the above, it is predicted that the strength of people's community identification moderates the effect of tariff structure on resource use. When the social dilemma is most salient, that is, in periods when the need for water is high yet the availability is low (i.e., in the summer season), the temptation to increase demands in households with a variable tariff is held back by the prospect of an increase in use costs. This effect is expected to be the same for both low and high community identifiers. However, if households are on a fixed tariff and therefore have no financial incentive to conserve, the presence or absence of a sense of community identity is expected to make a difference. Low identifying members on a fixed tariff have no strong motives to restrain as they are concerned about neither the impact of excessive use on their bill nor on the interests of the wider community. In contrast, high identifying community members will conserve due to concerns about the impact on the community. This hypothesis was tested in both a field study and laboratory experiment.

Field Study on Water Conservation

Method

Participants. This study was conducted in Chandler’s Ford, a relatively affluent town in the Southern part of England in the county of Hampshire. There were 593 households with a water meter in Chandler’s Ford, 451 of which were charged for the amount of water used (variable tariff), while 142 were charged according to a fixed tariff.[2] The meter at all properties was read monthly for a period of nine months. Once during this period a short questionnaire was sent to each of these households. Of the 593 questionnaires, 278 were returned complete (47.2%), 203 from variable tariff households (45.0%), and 75 from fixed tariff households (52.8%).

Of the returned questionnaires, 77% were completed by men and 23% by women. The age groups represented in the sample varied from 16-30 (0.4%), 31-45 (12.9%), 46-60 (45.3%) to over 60 (41.4%). The typical respondent lived in a detached house (65.6%), with an estimated value between 100 and 200.000 pounds (75%), on a lot size of 600 square meters or more (53%). The average household size was 2.7 people. Furthermore, residents had lived at their present address for 13 years on average.

There were some differences in the demographic make-up of the tariff groups, which could account for potential differences in water consumption. The variable tariff group was comparatively older, Π^2(3, N = 275) = 9.64, p <.001, they lived longer at their present address, F(1,277) = 9.81, p <.01, and their household size was comparatively smaller, F(1, 277) = 28.64, p <.001.

Design and procedure. A unique setting was available for this study. In 1989 meters had been installed in all the properties in one particular area of Chandler's Ford. This was part of a national trial on water meters, conducted in several areas of the country simultaneously, which lasted for two years. Although water meters are installed routinely in new properties, currently only about ten percent of houses in the UK have a meter (OFWAT, 1996). During the trial period all properties were charged according to use, but at the end people could revert back to a fixed charge-system, and 24% of households did. Thus, at the time of our study – seven years later -- all properties in the sample had a meter, but just over three-quarters of households were actually charged for what they consumed (variable tariff), whereas the rest paid a fixed rate. Both groups received quarterly water bills, indicating the amount of money charged to their account (i.e., most households paid by direct debit).

In September 1997 all 593 households in the sample received a small questionnaire by mail, which was addressed to the person in the household who paid the water bill. Of the returned questionnaires, 93% were indeed completed by the bill payer. An introduction letter was enclosed to explain the purpose of the study. It was stated that the research involved collaboration between researchers from Southampton University and the water company to examine the relation between demographic and social variables and the domestic water demands of households. It was stated that all answers people gave would be treated confidentially. After two weeks a reminder was sent to all households participating in the study, irrespective of whether they had returned the questionnaire. Those who returned the survey within a month received a copy of the results, and a small gift (a water saving garden device).

Questionnaire. The questionnaire consisted of two parts. The first part asked questions concerning their attitudes toward water use and conservation, their attitudes towards the water company and, relevant to the present study, the strength of identification with their community. To measure community attitudes a simple instrument was used (adapted from Tyler & Degoey, 1995), which contained the following three items tapping different aspects of community identity: (i) I feel strongly attached to the community I live in; (ii) There are many people in my community whom I think of as good friends; and (iii) I often talk about my community as being a great place to live (1 = very strongly disagree, 5 = very strongly agree). These items correlated highly (alpha = .79). Accordingly, one community identification scale was constructed by taking the average across these items. A median split with a score of 3.67 (SD = 0.78) as cut-off point was performed on the scale, which created a group of low (N = 133) and high community identifiers (N = 145).[3]

The second section asked about the demographic make-up of the household with questions referring to the number of people in the household, age and gender, and annual income of the household (optional). I also included questions referring to the type of housing people lived in, how long they had lived there, and a check on whether they were charged for their use according to a variable or fixed tariff.[4] All people in the sample correctly identified they were charged at either a variable (N = 203) or fixed rate (N = 75) for the water they consumed.

Water consumption records. Monthly consumption figures (in 1000 liters) were collected from each household during the nine-month period from March 1997 to November 1997. Meters were read on the last day of each calendar month by employees of the water company. Meters could be read without making an appointment with the customer as they were conveniently located outside the property (i.e., mostly under the street pavement).[5]

Results

Water use. To test the predicted moderating effect of community identification on water use for the two tariff groups, I conducted a repeated measures ANOVA on the consumption data, whereby the nine months interval was regrouped into three seasons: Spring (March through June), Summer (July through September) and Fall (October, November). The average water use in 1000 liters per household per season served as input data for this analysis. Accordingly, the repeated measures ANOVA was conducted with a 2 (Tariff system: Fixed vs. Variable) x 2 (Community identification: Low vs. High) x 3 (Season: Spring vs. Summer vs. Fall) mixed design. It was predicted that the impact of community identification would be more pronounced in the fixed tariff group, especially in the summer season.[6]

Three demographic factors were significantly different between the tariff groups (household size, age of resident, and duration of stay), and they were included as covariates in a preliminary analysis. This analysis revealed that only the effect of household size was significant, F(1, 266) = 20.98, p <.001 (age and duration of stay, respective F's(1, 266) = 1.32 and 0.18, n.s.). Accordingly, in the final analysis on water use household size was included as the single covariate.

The analysis first yielded a strong main effect of household size, F(1, 273) = 41.94, p <.001, indicating that water use increased with household size (for Spring, Summer, and Fall the respective r's = .33, .41, and .45; p's <.001). Controlling for this factor, the ANOVA results revealed several main and interaction effects pertaining to the main research hypothesis.

Overall, water use was much lower in the variable tariff group (adjusted M= 10.05) than in the fixed tariff group (adjusted M = 16.58), F(1, 273) = 17.40, p <.001. This effect was qualified by a two-way interaction between tariff and community identification, F(1, 273) = 7.52, p <.001 (see Figure 1). There was no significant difference between low (M = 9.60) and high community identifiers (M = 10.50) on a variable tariff, F(1, 202) < 1. However, on a fixed tariff low identifiers (M = 19.11) consumed significantly more than high identifiers (M = 14.04), F(1, 74) = 3.73, p <.05. This effect was further qualified by the predicted three-way interaction between tariff, community identification, and season, F(2, 272) = 3.16, p <.05 (the associated means are displayed in Table 1).

To provide a precise test of the central hypothesis, separate analyses were conducted for each tariff group (with household size as covariate). To support the main prediction, community identification should be more related to water use in the fixed tariff group during the Summer season. In the variable tariff group, the effect of community identification should be reduced, and especially in the spring and fall (when demands are lower).

Consistent with the prediction, a 2(Community identification) by 3 (Season) repeated measures ANOVA for the variable tariff group revealed no evidence of an interaction, $F(2, 199) < 1$. As can be seen in Table 1, the average water use in each of the seasons only slightly differs between high and low community identifiers.

However, the picture looked different for the fixed tariff group. A 2 (Community identification) by 3 (Season) repeated measures ANOVA for this tariff group yielded the predicted interaction, $F(2, 71) = 3.16$, $p <.05$. To further decompose this effect, separate analyses were performed, contrasting high and low community identifiers, within each of the three seasons. Ideally, only the contrast for the Summer (i.e., the period in which demands were high) would be significant. This was indeed the case. Especially during the Summer, low identifiers ($M = 21.93$) used more water than high identifiers ($M = 14.64$), $F(1, 72) = 3.89$, $p <.05$. During the Fall, there was no such difference between low ($M = 15.96$) and high identifiers ($M = 13.10$), $F(1, 72) = 1.47$, $p =.23$. This was also true for the Spring period, $F(1, 72) = 2.62$, $p =.11$, although the means suggest a higher use for low ($M = 19.45$) than high community identifiers ($M = 14.93$).[7]

Laboratory Study

The field study revealed substantial, yet not entirely conclusive evidence for the main research prediction. First, the possibility of a self-selection bias in the formation of tariff groups cannot be fully excluded. In the analysis I have eliminated the influence of some obvious external factors, such as income, household size, and lot size; yet there is still a possibility that the obtained differences are caused by other factors (the third factor problem).[8] Second, even though water resources were relatively shorter in the Summer than in the other seasons, people may not have perceived this; hence, the social dilemma may not have been salient to everyone involved. To address these issues, a laboratory experiment was designed to test the main hypothesis in a controlled environment, with a random assignment of participants to conditions in which a resource shortage was contrasted with a resource abundance.

A computer mediated social dilemma task was created, in which participants were assigned to small groups of six people each, and they were asked to make a request from a common resource pool, filled with a limited number of points (representing a monetary value). Each individual would receive the amount he or she requested; however, if the total sum of requests exceeded the pool size, no one in the group would get any points. The conditions of this task were manipulated so that groups either (i) faced a small or a big pool (resource state); (ii) paid a fixed or variable tariff for the number of points harvested (tariff system), (iii) identified strongly or weakly with the group (group identification).

Method

Participants and design. Participants were 43 female and 34 male psychology Honors undergraduates from Southampton University, all between 18 and 22 years of age. They participated in this computer-led study for the fulfillment of their course requirements. For each experimental session, six people were invited simultaneously to the laboratory.[9] Students were randomly assigned to each of eight experimental conditions following a 2(Tariff system: Fixed vs. Variable) x 2(Group identification: Low vs. High) x 2(Resource state: Shortage vs. Abundance) between-participants factorial design.

<u>Procedure.</u> Upon arrival in the lab, participants were guided to separate cubicles with a chair and table, where they were seated in front of a computer. All further instructions were transferred via the computer. After a brief introduction on the use of the computer, participants received information about the study. They were going to work on a group problem, explained as follows: "In everyday life there are various resources that are valuable to everyone, which everyone wants to use as much as they can. If people restrain themselves in using the resource there will be sufficient for everyone. However, if people use too much of the common resource, there is a danger of depleting it. Each person thus must decide for themselves how much of the resource they want." This was illustrated with an example close to the students' experience, the use of shared departmental computers.

Thereafter, the actual task was introduced. It was explained to people that they soon were to make a decision how many points to take out of a common resource pool, shared by all six group members. Each point represented 30 pence ($0.50), thus it was in their interest to harvest as many points as possible, but with an imposed maximum of ten points. It was made clear that, out of budgetary reasons, the amount of money would not be paid out directly, but each pence they earned would give them one lottery ticket for a raffle with a prize of £25. Also, to explain the dilemma character of the task, it was made explicit that if the total number of harvested points by group members would exceeded the pool size, no one would get any points.

Manipulation of resource state. Participants were told that the number of points in the common resource pool was not fixed, but varied between 20 and 50 points. The computer would randomly decide for each experimental group how many points were available in the pool. In practice, half of the participants received information that the resource pool contained 48 points (Abundance-condition), whereas the others were told the pool contained 24 points (Shortage-condition). The optimal harvest in these respective conditions would thus be either 8 or 4 points per person.

Manipulation of tariff system. Referring to the example of the shared departmental computer resources, it was explained that in some departments students were asked to pay money for using these computers. Similarly, there were costs involved in harvesting points from the pool. In the Fixed Tariff-condition, it was stated that for a standard fee of 30 pence, participants could harvest as many points as they wanted from the common resource. In the Variable Tariff-condition, people would have to pay £0.05 for each point they harvested. This amount was chosen because with an average pool size of 36 points (24+48/2) and an optimal harvest of 6 points each, the fee would be equal across the tariff conditions (6x0.05 = 0.30). To pay for this, each person started with a fee of £1, put in an envelope on the table next to the computer. The final payments would be settled with the experimenter after the study.

Manipulation of group identification. Participants then received some more information about the purpose of the study. The present study ran in conjunction with studies at other universities in Southern England. A list of names of these universities (supposedly) participating in the study was provided to the students. They were chosen carefully to make sure they were comparable in size and entry requirements (many participants may well have applied to one or more of these before joining this university). In the High Group Identification-condition the purpose of the study was said to be to draw a comparison between how student groups at different universities would manage the resource task. In the Low Identification-condition the purpose of the study was to see how student groups in general would manage the task, and no reference was made to making comparisons between universities (for a similar procedure, see Brewer & Kramer, 1984; Van Vugt & De Cremer, 1999).

Manipulation checks. In order to make sure that all participants understood the instructions, a summary of the information was presented on screen before the start of the task. In addition, a small quiz was conducted to test understanding of the instructions. For each question the correct answer was provided as feedback upon completion. They were asked how many points there were available in the common resource pool. All but one participant in each of the Resource-conditions correctly identified this number (either 48 or 24 points). Second, we asked via a multiple choice question to indicate the nature of the tariff system ("What are the costs involved in taking points from the resource?" 1 = no costs involved, 2 = a standard cost of 0.30 pence regardless of number of points, 3 = 0.05 pence per point taken). In the Fixed tariff-condition, one participant failed to answer this question correctly, whereas in the Variable tariff there were two people mistaken. A third multiple choice-question was issued to measure people's understanding of the study's purpose (the group identification-manipulation check). All but one participant in each condition correctly indicated that the study's purpose was to compare how student groups in general (Low Identification-condition) or student groups from different universities (High Identification-condition) were doing in the task.

Even though the correct answer to these questions was provided as standard feedback to all participants, I conducted the main analyses both with and without people who made at least one mistake in answering the questions ($\underline{N} = 5$). As these results turned out to be virtually the same, only the analyses of the full sample will be reported.

Finally, after the test students were asked about the strength of identification with their university ("How much do you identify with your university?" 1 = not at all, 7 = very strongly). Students in the high identification-condition displayed a greater identification with their university ($\underline{M} = 5.28$, $\underline{SD} = 1.12$) than students in the low identification-condition ($\underline{M} = 4.73$, $\underline{SD} = 1.09$), $\underline{F}(1, 73) = 4.28$, $\underline{p} <.05$, which showed that the identity-manipulation had been successful.

Dependent measure. Subsequently, the task started and the main question posed to participants was "How many points do you want from the pool? (type in any amount with a minimum of 0 and a maximum of ten points)". The program was designed in such a way that any number outside this range was registered as an error, and people were asked to retype a different amount.

Debriefing. After indicating their choice, they read on the computer screen that the task had now finished, and they would receive a debriefing from the experimenter. In the debriefing, they were told about the real purpose of the study and the nature and background of the manipulations. It was further explained that, at the end of the study, one person would be selected to receive the promised lottery prize of 25 pounds.

Results

A 2 (Tariff: variable vs. fixed) by 2 (Group identification: low vs. high) by 2 (Resource state: shortage vs. abundance) ANOVA with a between participant-design was performed on the individuals' request to test the predicted moderating impact of group identification on the effect of the fixed (vs. variable) tariff.

There was no significant main effect of tariff system nor a two-way interaction between tariff and group identification, both F's(1, 59) < 1. However, the analysis yielded a main effect of resource state, F(1, 59) = 43.43, p <.001, and an interaction between resource and tariff, F(1, 59) = 4.20, p <.05. Both were qualified by the predicted three-way interaction with group identification, F(1, 59) = 4.02, p <.05.

The effect of group identification should be larger especially in the shortage-condition under a fixed tariff. The means associated with this effect are reproduced in Table 2. This table shows quite clearly that among high identifiers under a fixed tariff there was a great difference in request between the abundance (M = 7.25) and shortage-condition (M = 4.12; t(14) = 4.94, p <.001). This was not so for low identifiers under a fixed tariff (abundance vs. shortage: M's = 5.56 vs. 4.88, t(14) < 1). Under a variable tariff, however, the difference between the abundance and shortage conditions was about the same for both high identifiers (abundance vs., shortage: M's = 6.33 vs 3.56; t(16) = 3.09, p <.01) and low identifiers (abundance vs. shortage: M's = 6.89 and 3.50; t(14) = 6.55, p <.001).

Finally, when focusing on the shortage-condition, the same picture emerges. Under a fixed tariff high identifiers (M = 4.12) were relatively more modest in their request than were low identifiers (M = 4.88), t(15) = 2.15, $p < .05$, whereas under a variable tariff the requests of high and low identifiers were quite similar (M's = 3.56 vs. 3.50), t(15) < 1. These experimental results revealed further support for the claim that group identification moderates the effect of tariff, in particular during a shortage.[10]

General Discussion

The primary purpose of this research was to investigate the moderating effects of community identification on the use of financial incentive strategies to promote conservation. Both the field and lab study revealed that strong community identification was particularly instrumental in preventing overuse of the communal resource in periods when supplies were relatively short and there was no financial incentive associated with restraint.

In the field study, low community identifiers on a fixed tariff showed a strong increase in water use in the Summer of 1997 compared to other user groups. Similarly, the lab study showed that there was a lower average request in the resource shortage than abundance-conditions across all user groups, except for low group identifiers on a fixed tariff system. Extrapolating these findings to natural resource management in society, it seems that in situations with the potential risk of a resource shortage – when needs are high, yet supplies are relatively short -- communities must rely either on adequate incentive systems or on the strength of people's community ties to save valuable resources.

This finding contributes to our thinking about conditions for successful resource management. In her influential book on common resource management Elinor Ostrom (1990) distinguishes between three broad classes of factors contributing to efficient resource management: (i) local resource dependence, (ii) presence of community, and (iii) appropriate rules to regulate use. This research underscores the importance of this taxonomy by showing that, if a decrease in resource dependence is impossible, strategies to promote conservation should be targeted either at strengthening local community networks or designing adequate incentive systems for conservation. The first strategy will be particularly important in areas where resources are scarce, but where a system of monitoring is practically infeasible (e.g., dorms, apartment blocks) or socially undesirable (e.g., poor areas).

The beneficial effect of community identification is also relevant from a theoretical perspective. This field study is, to my knowledge, the first to show the importance of this factor in moderating voluntary cooperation in large scale natural social dilemma. Until now, the positive role of social identification has been demonstrated in social dilemma studies involving relatively small groups of between 4 and 32 members, where group identification is artificially created by inducing a common fate procedure (Brewer & Kramer, 1986; De Cremer & Van Vugt, 1999). It is encouraging that social identification processes, as measured by a simple three-item survey, can also predict behavior in a large-scale natural dilemma in which the impact of each individual contribution is negligible (cf. personal efficacy; Kerr, 1989). Future research on large-scale resource conservation might want to include this easy-to-administer instrument.

The present studies do suggest, however, that community identification processes will only kick in when there is a direct threat to the community and there is no personal incentive for cooperation. Recall that there were no significant main effects of identification in both studies. Based on these results (and others that failed to obtain a straightforward social identity effect; Bouas & Komorita, 1996) it is probably more appropriate to think of social identification as a buffer, which elicits cooperation only when it is collectively needed, like in a shortage. In this regard, it was interesting that in the abundance-condition of the lab study, high identifiers on a fixed tariff used more of the resource than low identifiers – they were underusing the resource. This further suggests that high identifiers adjust themselves better to the resource situation, showing restraint only if it is collectively needed.

Strengths and Limitations of Present Research

One strength of the present research is the combination of field and lab data, which enabled us to address the inherent weaknesses of either of these approaches. For example, the potential danger of a self-selection bias in the comparison of the variable versus fixed tariff households was addressed by assigning people randomly to either of these conditions in the lab study. The convergence between the main results of these studies gives us additional confidence in both the internal and external validity of our findings. This is particularly encouraging in light of the controversy about the use of experimental situations to simulate real-world social dilemmas. In the past, worries have been expressed about the external validity of social dilemma research (Nemeth, 1972; Pruitt & Kimmel, 1977; Van Lange et al., 1992), and systematic comparisons between the results of lab and field research on social dilemmas have been rare (for an exception, see Samuelson, 1990). These results show that it can be valuable to use a combined approach where field research, with its inherent design weaknesses, is complemented with more rigorously designed experimental studies.

I must also note several limitations of the research. A first limitation concerns a conceptual difference between the field and lab study. Whereas the field study used a longitudinal design to investigate water use patterns over a nine months interval, the lab study was basically a one-shot dilemma situation. Conceptually, the water conservation problem is more similar to a resource dilemma, in which individuals make repeated requests from a resource that changes in size, as a result of people's requests and a certain replenishment rate. The time dimension adds a complexity to the dilemma (Komorita & Parks, 1994), because people might conserve for strategic, personal reasons (to make sure they will have enough for the future) as well as for moral, pro-social reasons (helping out the community). For establishing the effect of community identification in this study, it was deemed important to disentangle these motives and for this reason a single dilemma task was considered more appropriate. Nevertheless, for further research on the effects of tariff systems it is worthwhile to use an experimental resource dilemma task, like the one developed by Messick and Samuelson (Messick et al., 1983; Samuelson et al., 1984), which bears a greater similarity to real-world resource problems.

Second, there was a discrepancy in findings of the field and lab study regarding the main effect for tariff. This effect was highly significant in the field study, which is comparable to the results of previous research on water tariffs (Hankle & Boland, 1971), and theories on reward-performance contingencies (Eisenberger, 1992). That there was no tariff effect in the lab study might have to do with the relatively minor sums of money at stake (30 pence per earned point). In contrast, the amount households could save by restraining water use could easily amount to 20 pounds per month (OFWAT, 1996). Furthermore, whereas the variable tariff in the field study was associated with a real financial loss, in the lab study people had first been given a start-up fee to pay for their use of the resource.

A third limitation is that, even though the main prediction of the research was supported, we do not know which underlying behaviors caused the effect. Differences in water use between households can be attributed to curtailment (e.g., frequency of showering or taking baths) or the absence of water consuming devices (e.g., sprinklers, dishwashers; Geller et al., 1983). Yet, the fact that there were no systematic income or life-style effects suggest that distinct behavioral patterns are the most likely explanation. Because the differences were most pronounced during the summer it may well mean that they were due to variations in outdoor use (e.g., sprinkling garden, filling swimming pool). And, because this, unlike private indoor water use, is a public behavior it could explain why high community identifiers were particularly willing to show restraint. For them it is important to be a respected member of the community and so they cannot afford to be deviant (Tyler & Degoey, 1995).

Implications and Directions for Future Research

The following directions for future research are suggested by the present findings. Further laboratory experimentation is needed to compare the effectiveness of different tariff systems on use. Small-scale experimentation may prove to be a successful and cost-efficient way to test out the impact of different, and perhaps more sophisticated tariffs (e.g., seasonal and block tariffs). Also, more field research is needed to establish the specific nature of differences between tariff groups in overall use so that education programs can be tailored at different user groups.

Rather than education and persuasion, what seems most effective in promoting conservation according to a social dilemma analysis is the introduction of a variable tariff system (recall that in the UK only 10% of households have meters). Variable tariffs not only decrease resource demands structurally, but they are particularly effective in a resource shortage to moderate the behaviors of people who would not otherwise cooperate for the benefit of their community.

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Author's Notes

Mark Van Vugt, Department of Psychology, University of Southampton, Southampton, S017 1BJ, United Kingdom; mvv@soton.ac.uk

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Footnotes

1. I have chosen to use the term social dilemma throughout this article, because it is the generic term for a class of problems in which personal and collective interests are at odds (Komorita & Parks, 1994). Natural social dilemmas, like water conservation, are in the literature also referred to as commons dilemmas, resource dilemmas, or common pool resource problems.
2. The variable tariff system, in fact, included a small fixed charge for sewage and waste water. The charges in the fixed tariff system were only very indirectly related to use; they were calculated on the basis of the value of the property. A comparison between these tariffs showed that the water charges under a variable tariff were comparable to a fixed tariff for an average size household (3-4 people) with an average property value (OFWAT, 1996).
3. A comparison between the two tariff groups revealed no systematic difference in level of community identification, $\Pi^2 (1, N = 278) < 1$. Also, community identification appeared to be unaffected by any of the demographic factors.
4. The duration of stay-measure enabled me to compare people who had been living in their present home during the metering trials (1989-91; 62.8%) with those who had moved their afterwards (33.8%). These two groups were contrasted, but no significant difference emerged in average water use, $F(1, 278) < 1$.

5. The surveys were sent out to customers in the middle of September '97. This was considered a convenient period for the survey as customers would not have received their summer bill yet, and their answers could, therefore, not have been affected by feedback about their consumption. We cannot be sure about the potential impact of completing the survey on their use in the subsequent months (October-December). Yet the fact that consumption patterns in the Fall were quite similar to the Spring suggests no such effect.
6. A preliminary statistical analysis was performed using the original nine months data. Because this analysis revealed more or less the same results as when they were divided into three seasons, I decided, for reasons of brevity and simplicity, to present only the latter analysis here. The monthly results showed an overall peak in use in September, the last summer month, perhaps because this is when people in the UK normally return from summer holidays.
7. There were two other significant findings that emerged from the analysis of the consumption data. There was a mean effect for Season, $F(2, 272) = 4.12$, $p < .02$, which was qualified by an interaction between Season and Household size, $F(2, 272) = 5.45$, $p < .001$. It appeared that the differences between larger and smaller households in average water use were particularly distinctive in the Summer, and less so in the Spring and Fall.
8. Although there might be a potential third factor problem in interpreting the main effect of tariff system, it is difficult to see how any such factor

could explain the moderating influence of community identification on water use.

9. Because in three of the sessions only five people showed up, experimental assistants were asked to participate in the group as “bogus” members. Once participants were in their cubicle, the assistants left the scene.

10. I also examined what the obtained requests, if combined, would have meant for the preservation of the common resource pool. To this end, I contrasted the mean request with the optimal request had individuals used an equal division-rule to partition the resource (Allison & Messick, 1990). In the shortage-condition the optimal request would be 4 (24 points in total), whereas in the abundance-conditions the optimal use would be 8 (48 points in total). Analyses of the deviation-scores (from the optimum) revealed that in all the abundance-conditions the resource would have been saved, even though people were not using it very efficiently (deviation score of -1.50 points; $p < .05$), in particular not in the low identification-fixed tariff condition (-2.44). In the shortage-conditions use was more efficient (+0.01; n.s.), but the resource would have been depleted in the fixed tariff-conditions (+0.50; $p < .05$), particularly with low identifiers (+0.88; $p < .05$).

Table 1. Monthly Water Use as Function of Tariff System, Community Identification, and Season

		Season		
		Spring	Summer	Fall
Tariff System	Community identification			
Fixed	Low	19.45_a	21.93_a	15.96_a
		(2.15)	(2.78)	(1.63)
	High	14.39_a	14.64_b	13.10_a
		(2.25)	(2.90)	(1.70)
Variable	Low	10.20_c	10.00_c	8.61_c
		(.58)	(.40)	(.38)
	High	11.33_c	10.80_c	9.37_c
		(.40)	(.37)	(.35)

-- Table 1 continues –

Note. The scores are given in 1000 liters averaged per month of the season; all scores are adjusted for differences in household size; means with a different subscript differ significantly from each other for column-wise comparison;

Table 2. Request as Function of Tariff System, Resource Condition, and Group Identification, Study 2

		Resource	
		Shortage	Abundance
Tariff system	Group identification		
Fixed	Low	4.88_{a1} (.55)	5.56_{a1} (.52)
	High	4.12_{a2} (.55)	7.25_{b2} (.55)
Variable	Low	3.50_{a2} (.55)	6.89_{b2} (.55)
	High	3.56_{a2} (.52)	6.33_{b2} (.52)

Note. Requests could vary from 0 to 10 points; means with a different subscript differ significantly from each (letter symbols for row-wise comparisons, and numeric symbols for column-wise comparisons).

Figure Caption

Figure. Average monthly water use as a function of tariff system and strength of community identification.