

Communication and local knowledge in common pool resources experiments. Experiences from three new EU member states

Kluvánková-Oravská^a T, Zikos D^b., Sláviková L^c.

^a Centre for Transdisciplinary Studies of Institutions, Evolution and Policies (CETIP), Institute of Forecasting, Slovak Academy of Sciences, Sancova 56 Bratislava, Slovakia progkluv@savba.sk

^b Helmholtz Centre for Environmental Research – UFZ, Permoserstrasse 15 04318 Leipzig, Germany

^c Institute for Economic and Environmental Policy, University of Economics (IEEP), W. Churchill Square 4, 130 67 Praha 3, Czech Republic,

Abstract

The governance of common pool resources (CPR) implies establishing compatibility between ecosystems and social systems and enforcing governance institutions as essential links to maintain the capacity of socio-ecological systems. In the given context a behavioural experiment with a CPR was conducted, inspired by the innovative work of recent Nobel Prize laureate Elinor Ostrom and the Center for the Study of Institutional Diversity, Arizona State University. As such an experimental study on dilemmas on the commons, following the field experiment protocol for forest game used in Colombia and Thailand, was replicated within the European Marie Curie Research Training Network “GoverNat: The experiment was further developed by the authors to address the effects of communication and conducted in three new member states that joined the EU in 2004: Cyprus, the Czech Republic, and Slovakia. The EU membership brought an end to a relatively long period of isolation of the three countries from (Western) European discourses due to completely different reasons but which nevertheless led to some shared characteristics. From this perspective, our study identified the process of institutional rebuild of political institutions co-existing with long-established informal institutions. Results indicates positive effect of communication and local knowledge on the formation and acceptance of informal and customised rules and sustainable use of natural resources.

“You can discover more about a person in an hour of play than in a year of conversation.”

Plato (428 BC-348 BC)

Introduction

Understanding human behaviour represents a fascinating field of social science defined by Elinor Ostrom (1998) as the study of “the world of possibility rather than necessity”.

DRAFT version for ISNIE 2010. Please do not quote without the authors' permission!

Social dilemmas on common pool resources are being on the top of interdisciplinary research agenda for several decades (Frohlich et al 1970, Balaz 2009, Dawes et al 1986, Janssen 2006, Ostrom 1998, Ostrom et al 1991, 1994.) The particular research focuses on series of key questions: how to govern common pool resources effectively? How can we predict behaviour of decision makers? How do resource dynamics and communication affect the ability of groups to organize and respond in common pool resource dilemmas?

Today it is evident that rational choice models, explaining human decisions by maximising individual benefit can no longer fully address the social dilemma. It is well documented that human actions are diverse, include large variations of interests, traditions, informal norms and other variables of decision-making that affect willingness and ability of individuals to participate on collective actions. A second generation of rational choice theories thus have ambitions to address attributes affecting human behaviour such as the role of trust building in fostering or inhibiting communication and cooperative strategies, reciprocity, reputation (Ostrom 1998, Boyd and Richerson 1988 and others) and diverse motivation for collective actions, known as 'other regarding preferences'.

Existing and novel theories trying to explain behavioural patterns are traditionally confirmed by empirical and experimental studies. Experiments offer the possibility to test a replicated decision making situation and the effect of institutional innovations on the behaviour under the controlled situation (Ostrom 1998, Janssen 2009). Furthermore such experimental techniques usually involves lower costs than case study research. Experiments related to collective action of the commons represent a form of social dilemma where human subjects face a situation in which private interests are in conflict with group interests (Janssen 2009). They are usually undertaken in laboratory conditions with undergraduate students. There is however a growing criticism toward the limits of laboratory experiments, focusing on the abstract nature of decision making, the limited subject pool, the small incentive and the subject self selection (Cooper, 2006; Levitt and List, 2007a, 2007b, 2008, Ahn, Ostrom and Walker forthcoming). Such criticisms are also known as external validity of laboratory experiments in contrast with internal

DRAFT version for ISNIE 2010. Please do not quote without the authors' permission!

validity of case studies (Janssen 2009). Thus there is a growing interest on experimenting with real decision making subjects in the field in an effort to overcome validity problems of laboratory experiments and case study approaches (Cameron, 1999; List, 2004; Carpenter et al., 2005, 2007; Henrich et al., 2006, Cardenas, J.-C. 2001, Cardenas et al 2004, Cardenas, Janssen, Bousquet, forthcoming, Slonim and Roth, 1998, Sears, 1986; Potters and van Winden, 2000 etc.).

In our paper we focus on the use of field experiments to study governance of common pool resources in three new member states of the European Union. The particular field experiment had been originally developed by Cardenas et al., (forthcoming) and was applied initially in Colombia and Thailand. It was later replicated within the European Marie Curie Research Training Network “GoverNat: *Multi-level Governance of Natural Resources: Tools and Processes for Water and Biodiversity Governance in Europe*”. A novel and challenging element of field experiments with common pool resources is to address ecosystem institution fit (Young 2002) by the inclusion of ecosystem dynamics into the game design (Janssen, Anderies, Ostrom 2007, Cardenas et al forthcoming). The experiment in this paper not only includes ecosystem dynamics but it was further developed by the authors as to address the effects of communication. The experiment was conducted both in the field with forest users and owners and in laboratory conditions with university students, across three new EU member states: Cyprus, the Czech Republic, and Slovakia.

All three countries joined the European Union in 2004. Their EU membership brought an end to a relatively long period of isolation from the (Western) European discourses. This fact was due to completely different reasons but led largely to some common characteristics shared by the case study areas.

Cyprus constitutes a geographically remote island at the very edge of Europe and the Mediterranean Sea. Two communities and four self-administrative entities¹ with little

¹ The two Cypriot communities, the British sovereign military bases, and the UN administrated buffer zone

interaction share limited resources. The complexity of the situation increases the uncertainty over the outcome any discourse on common natural resources might take. Furthermore, the available resources may be further strained upon by the climate change (Alcamo et al., 2007). Areas, such as the depletion of vital natural resources and its impact, remain vaguely explored island-wide although they will necessarily become high priority issues in the near future (Sorman and Zikos, 2009). From this perspective interviews revealed the representativeness of “forests” as indicators of “healthy nature” in the mindsets of the Cypriots. Forest in Cyprus constitutes public property but small-scale users can apply for permission to use the resource for commercial or private purposes.

In the Czech Republic and Slovakia in socialism internal civic society institutions were replaced by externally designed institutions for top-down control. This seriously affected the capacity of the new democratic regimes to develop appropriate institutions (Kluvankova-Oravska et al. 2009). The Western model of privatisation was rapidly introduced as an essential institutional transformation intended for instant implementation, ignoring the importance of interaction and co-evolution of institution, in particular recombination of new political and economic institutions with informal rules or shared mental models. In the area of biodiversity governance, state regime implemented during socialism resulted due to the absence of proper rules for governing into the open access. Massive ongoing institutional changes in the 90s, in particular implementation of private property without market institutions, often results again in inefficient institutional designs and over-exploitation of natural resources (Kluvankova-Oravska et al. 2009). The forest management in the Czech Republic and Slovakia today is subject to strict governmental regulation however the ownership structures is diversified. It mainly concern state forest, individual private owners and historical land co-ownership regime from the times of the Austro-Hungarian Kingdom ('urbars) as a form of self-governed land ownership. Urbars were re-established in the early 1990s and represent the most important non-state forest ownership type in Slovakia.

Summarising, we observed that forest represents the majority of ecosystems and thus the key common pool natural resource in Central Europe, while at the same time it was identified as the most significant symbol of nature in Cyprus. As such, the authors

selected an experiment including a “forest game”. In each country, 40 subjects participated on the game: 20 stakeholders linked to the specific resource as users or owners and 20 advanced university students in disciplines related to the environment for comparison. However, as the students presented a rather differentiated group (see Zikos et al, forthcoming). This paper concentrates on the games conducted with rural forest owners and users in five regions with high biodiversity values represented by national parks or other types of nature protected areas. All 60 subjects participated after the experiment on semi-structured interviews to find out demographic characteristics, reasoning of individual behaviour and similarities of the experimental design to the real decision making situation. In cases where a group was homogeneous and capable to respond collectively, a focus group discussion was undertaken instead of individual interviews. Additionally, some subjects participated in a post-experiment workshop and numerous informal discussions where the processes and results were presented and discussed jointly.

The key hypothesis to test is whether communication and local knowledge can increase cooperation for sustainable governance of forest in the enlarged EU. Additionally, we sought to explore further issues of decision-making such as effect of ecosystem dynamics on the governance, the role of trust building on increasing communication, the impact of the type and size of ownership as the characteristics of collective action on a common pool resource.

The second section of the paper sets up the theoretical and methodological basis, upon which our research was unfolded, highlighting the positive role of communication in cooperative behaviour and the factors that contribute for such positive effects to emerge. Section three constitutes the empirical part of the study. The authors present and analyse the results of the “forest game” in the three countries. Finally, the last section summarises the major findings of the research.

Communication and collective action

Early experiments with common pool resources were designed to question standard non-cooperative strategies of rational behaviour models, concentrated on appropriation problems (Ostrom, Gardner, Walker, 1994). In particular they pointed on the dominance of cooperative behaviour of studied individuals.

In numerous behavioural studies, communication was found a key factor of cooperative behaviour. For example, a meta analysis of more than 100 experiments, showed that communication increased cooperation in about 45% (Sally 1995). In experiments with common pool resources, communication was found having positive effect on the reduction of over harvesting against theoretical assumption (Janssen 2009). The positive effect of face-to-face communication in common pool resource dilemma was further explored by a number of studies (Ostrom and Walker 1991, Ostrom et al 1992, 1994, Ostrom 1998). Common pool resource experiments conducted with PhD students in Indiana, USA and at an international summer school in Slovakia studied such effects on subjects from 41 countries (Ahn, Ostrom and Walker forthcoming). Face-to-face communication played a major role in allowing groups to find cooperative solutions in social dilemma settings. The overall results imply that previously reported findings are not due to subject demographics or self-selection into the experiments. The findings obtained in this series of experiments replicate findings from similar experiments conducted with undergraduate students from U.S. universities and with farmers recruited from rural communities in Colombia.

Trust as mutual relationship with reciprocity and reputation is seen as key factor for the positive effect of communication (Sobel 2002, 2004, Putnam 1993, Brehm, Rahn 1997). It is argued that trust generally affects the individuals' willingness to initiate cooperation (Ostrom 1998). In common pool experiments, Ostrom (*ibid.*) documented that groups with higher initial trust reinforced via relationship with reciprocity and reputation by "cheap talks" achieve better social outcomes and vice versa. Failure of one the attribute results in cascading collapse of mutual relationship and loss of trust within the group. Similar experience was achieved in common pool resource experiments in Colombia (Cardenas et al., 2000, 2004). Local villagers knew the identity of others in the

experiment and sat facing one another in the communication experiments. With no communication, decisions changed over time toward the predicted Nash equilibrium similarly to experience received in the lab. Cardenas et al (ibid.) also concluded that group size matters: as it is easier to communicate in smaller groups, the quality of communication increases when the size of the group is smaller and it is easier to make optimal decision (see Cardenas et al., 2000, 2004). Even when the initial population is dominated by selfish individuals, the evolution drives the model towards agents with a level of other regarding preferences that enables a high level of cooperation (Janssen 2008).

Sparked by the above arguments and findings, the authors developed the forest game design employed in this research by including a third part of the game, where communication among the players is allowed. As such, subjects discuss face-to-face the rules of the game to be implemented, they can customise an existence rule or invent a completely new one. Furthermore, the subjects decide on the sanctions and jointly decide on any modifications they wish, with no formal enforcement. As expected, communication among participants influenced their decisions and the development of the game as a whole, while also providing some surprising preliminary findings as discussed in the following sections.

Results

General trends

Behaviour of players is summarised in three figures bellow. Figure 1 shows the mean and 95 percent high and low confidence intervals for group extraction over the rounds. Figure 2 presents earnings (extractions-sanctions) per rounds in stage two and three and the Figure 3 illustrates depletion of the forest stock over the rounds.

Figure 1: Group extraction by rounds

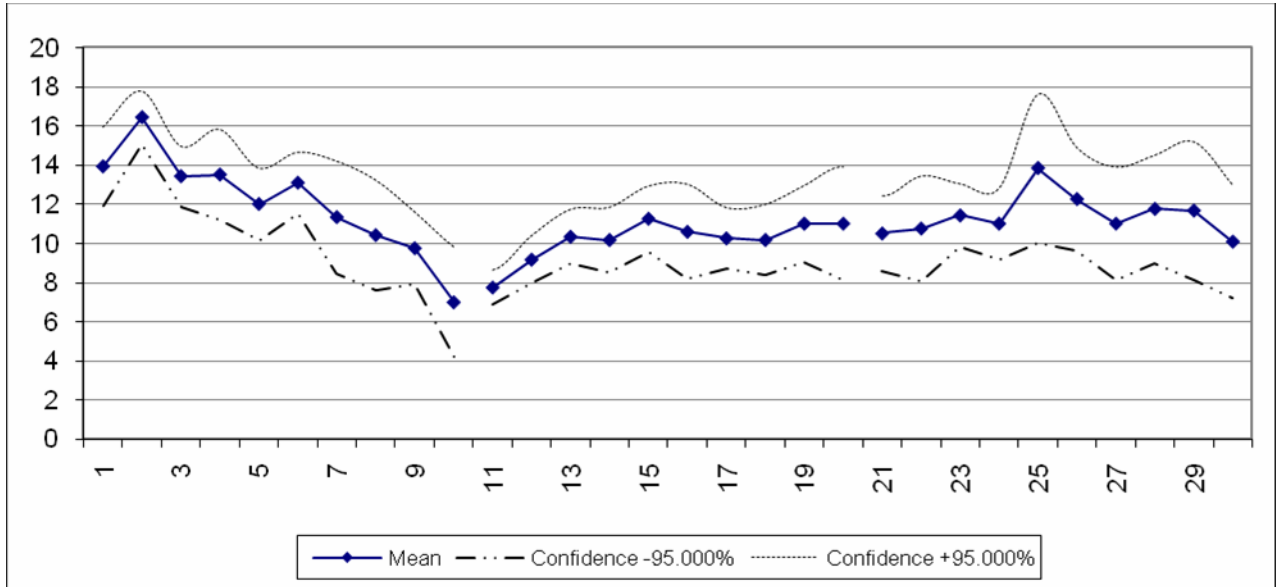
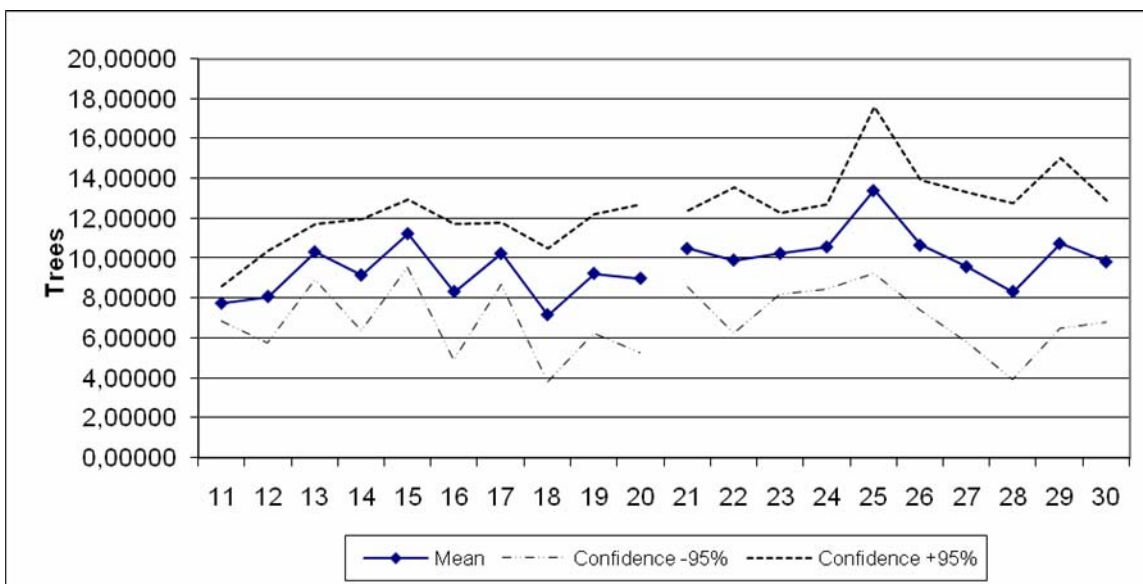


Figure 1 and 3 confirm findings of Cardenas (et al forthcoming) from Columbia and Thailand that high initial extraction in stage one is decreasing together with the forest depletion as an open access situation allows over-harvesting.

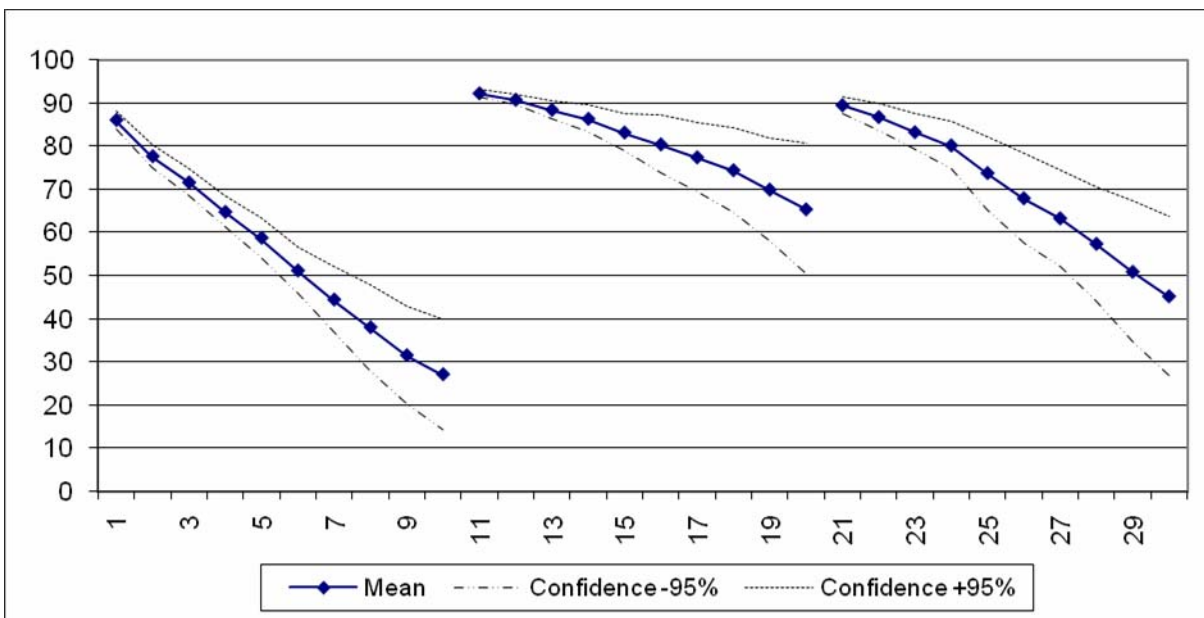
In the second stage where rules are voted and implemented to control harvesting the target to preserve the resource is largely achieved. Forest resources are maintained, however, the group earnings had been considerably reduced due to sanctions applied for rule violators on random basis (Figure2). As seen from confidence interval individual variations were minimal.

Figure 2 Group earnings (extraction-sanctions) per rounds in stage II and III.



In third stage Figure 3 shows that the resource was maintained at a level comparable to stage two, however the group earnings increases (Figure 2) thus reaching optimum balance between extraction and forest stock. In this stage 9 from 12 groups increased the group income compared to stage 2.

Figure 3: Depletion of the forest by rounds



Communication and learning

Behaviour of players in three stages of the game thus can be seen mainly as the effect of communication and learning. As seen on Figure 1 and Figure 2, in the first stage the players learned that extraction and income are not linearly dependent. Or similarly to Cardenas et al (forthcoming) that over harvesting results in reduction of the income as of forest stock would not allow for much recovery and declines. Extraction dropped to an average of nearly 10 units per group (2-3 units per player) allowed for the resource stock to sustain with more than 50 % left at the end of the stage. Thus major behavioural change in stage 2 is reduction of extraction. In stage 3 balance between extraction and forests stock was achieved as shows Figures 1 and 2, lowering forest stock to 45% on average but increasing income in about 20% compared to stage 2. Thus we see face-to-face communication and learning as variables that influence group dynamics and behaviour towards sustainable manners, balancing social, individual and environmental issues, as previously reported in for example Janssen (2009), Saly (1995), Ostrom (1998) or Ahn, Ostrom and Walker (forthcoming).

Secondly it is possible to argue that *ecosystem dynamics* provides motivation for optimum harvesting strategy and against selfish maximalization, as the knowledge on re-growth rate (10 % after each round) was found an incentive for informal group negotiations about limiting harvesting level below 15 units per round. Thus knowledge on forest re-growth represent the match between the key physical attributes of ecological and social systems and it is vital condition for the design of institutions used for their governance known as ecosystem –institution fit (Young, 2002). Fit provide connectivity within social and ecological systems that plays an important role in designing effective institutions for sustainable resource use as previously reported for example by (Gatzweiler and Hagedorn, 2002, Paavola and Adger, 2005 etc.).

Lastly communication had a considerable impact in terms of equity within the group. While in stage two, income differences were due to sanctioning that cut down earnings of constant law-breakers in the third stage incidents of cheating reduced (halved) compared to the second round.

The role of trust and forest size

Similarly to previous findings (Ostrom 1998, Cardenas et al 2000, 2004, Castilo forthcoming) the role of trust (initial and developed) played a determining role on the individual and group performance. We found that higher initial trust but also size of the resource (forest) increased cooperative behaviour in several individual cases. It can be documented by results of games with small forest owners (Slovakia and Cyprus). Those groups largely maintained the forest stock at sustainable level over stage 2 and 3, reflecting their direct connection to nature and personal skills from forest management. As those players reported in interviews, forest represent much more than monetary profit, compared to large scale owners that use forest mainly commercially. In most of groups we found that interpersonal trust involved higher "cheating tolerance" in particular towards community leaders. This is consistent with the role of leadership that is traditional in all three countries.

The particular finding supports Ostrom's (2006) argument on exogenous rules. According to her (ibid), even when the rules are monitored at realistically high levels, subjects cheat even though following the rule would generate optimal outcomes. On the other hand, Ostrom (ibid) further argues that, given the opportunity, experimental subjects will devise their own rule systems and impose sanctions on each other with greater success. These findings complement previous research by confirming the critical importance of communication and endogenous rule formation to achieve effective self-governance arrangements (Ostrom et al. 1992; Ostrom 1990). This is particularly prevalent for transition countries (Slovakia and Czech Republic) where self governance of local property regimes can support co-evolution of new and old institutions and institutional consolidation. Cooperative behaviour and reflexive governance observed in most of Slovak urbars could serve as evidence provided in this study.

The way rules were chosen and the role they played in the players' decisions provided another important preliminary finding. Subjects avoided the lottery rule reporting equity

arguments. Players generally preferred rotation and property rights, reflecting the needs for solidarity. Rotation and property rights, especially under the communication stage, reflected according to the interviews that followed institutions (often informal) that the stakeholders practised in reality. It should be finally mentioned that some groups selected a “no formal rules” strategy at the last stage of the game. Those groups were based only on trust mechanisms between the players and informal strategies changing through the game.

Local knowledge

It is particularly interesting that at the beginning of the game, some groups persistently required further information on the characteristics of the forest, as this would determine their cutting strategy. With those characteristics unavailable, they saw the experiment more as a game than a reflection of real conditions. That was particularly the case of larger owners or players with weak connection to the resource. Large owners lack incentive for stock preservation and preferred profit maximalization. Illustrative example of weak connection to the resource are three subjects – co-owners of the community forest, at the same time professional employers of national park. This was the only stakeholders' group where the forest stock was considerably over-exploited in all three parts and with highest individual extraction over three countries. This brings us to the possible statement, that even professional knowledge could not guarantee sustainable behaviour and that personal managerial skills are vital to achieving sustainable outcomes particularly in cases where governance is interconnected with ecosystem attributes. However, verifying this assumption requires further testing. Thus local knowledge and direct connectivity to the resource support sustainable behaviour.

Limitations

The third stage of the game, communication was introduced for the first time in this context in the particular experiment. Although it provided valuable insights on the effects of communication in the particular social dilemma under consideration, a series of limitations must be taken into account. As the participants were able to modify or introduce their own rules, some incompatibilities on how the researchers handled the players' decisions were to be expected.

Diverse cultural contexts presented some other difficulties in applying methodology, originally developed in English and homogenised as much as possible, to their cases. Cypriot participants kept asking, "How can a forest be private?" and "How can I own a part of the forest?". On the other hand, stakeholders in Slovakia and the Czech Republic insisted on a more detailed description of the forest, as this would determine their harvesting strategies. Additionally, the translation of the original English text led to some unexpected turns during the interviews as the words "public" and "common" mean quite the same in all the three languages in contrast to English. For the Czech and Slovak Republics, this is also partly due to the fact that community ownership was not practised during socialism. Those differences – although they do not considerably alter the overall results – highlighted the considerable necessity for a homogeneous methodological approach during the communication set of rounds in the future.

Conclusions

The field experiment initially applied in Colombia and Thailand was replicated within the European Marie Curie Research Training Network "GoverNat: *Multi-level Governance of Natural Resources: Tools and Processes for Water and Biodiversity Governance in Europe*" in three EU new member states Cyprus, the Czech Republic, and Slovakia. The experiment was further developed by addressing the effects of communication. Our experimental approach aimed to analyse the role of communication, trust local knowledge and ecosystem dynamics for the effective management of natural resources, complementing findings from Thailand and Colombia. Many partial findings were presented and explained in details in the paper.

Communication and learning of behavioural strategies greatly contributed to finding equilibrium between the individual and social optimums. Moreover, it allowed the formation of informal and customised rules that were largely accepted and followed. In such cases, small incidents of rule-breaking were tolerated. Additionally, cheaters were more reluctant to go to an extreme, feeling included in the community decision and as such partially responsible for the outcome of this decision. Communication was found also having positive effect on equity and trust building. First it reduces cheating as well as positively stimulated interpersonal trust and cooperation. Furthermore knowledge on ecosystem dynamics was found to stimulate cooperative strategy rather than profit maximisation.

Small-scale forest owners and users and areas with a collective ownership generally exhibited a more “resource-friendly” behaviour than large-scale owners and commercial users of the natural resource. The latter generally prioritised the individual benefit at the expense of the social or natural optimum. Dependence on the resource and local knowledge provides incentive for long term harvesting strategy of first type of players and it determined their behaviour to a higher degree.

Cultural attributes of stakeholders influenced harvesting decisions. However, the case of the urbars in Slovakia provided evidence that in the particular regime significantly higher adaptability was observed as well as intergenerational connectivity to the resource leading to sustainable behaviour despite 40 years of disconnection from the resource due to the socialism ².

We may conclude that common pool resource field experiment replicated in new EU member states support previous findings (Cardenas et al forthcoming, Janssen and Ostrom 2008, Ostrom 1999, Ostrom et al 2008 etc) that the communication, local knowledge, lead to more effective management and sustainable use of natural resources than large-scale professional but centralised management. In particular, face to face communication increases trust and may improve group performance as previously

² However it is analysed in separate publication

DRAFT version for ISNIE 2010. Please do not quote without the authors' permission!

determined by (Ostrom 1998, Janssen 2009). Secondly that knowledge on ecosystem dynamics generates motivation for cooperative strategy rather than profit maximisation. The employed experiment thus, constitutes an innovative tool to study social dilemmas and could substantially contribute to good “governing of the commons”.

Furthermore it provided an examples on successful self-organising and self-governing of commons. In general, it can have a broad impact on political sciences and ecosystem governance by deriving an understanding of what factors affect the ability of resource users to change institutional rules effectively.

On the whole, the experiment identified a series of emerging issues urging for further research. Namely, those areas of interest could refer to the following broad questions/categories: *Could policy experiments be employed as tools enhancing learning and capacity building? Could they foster co-operation over competition on natural resources especially in conflicting contexts? Is it after all the combination of local knowledge and managerial skills, participation and strong connection to the resource what indirectly leads to sustainable management?*

Acknowledgements

The authors are grateful for the support of the GoverNat Project and SPECTRA+ supported by the Research & Development Operational Programme funded by the ERDF. Also indebted to many people for their crucial assistance in organising and conducting the experiments. Our thanks go to Prof. Despo Kassinos at the University of Cyprus, Ourania Papasozomenou, the Mayor of Panagia, Dusan Bevilaqua, Daniel Bezdecik who assisted us with organising experiments in the field. Sonja Trifunovova, and members of CETIP team who contributed to the successful completion of the experiments. Marco Janssen for his kind assistance in shaping and understanding methodology and his comments on the early version. Finally, our gratitude belongs to the 120 players for their wholehearted participation in the experiment and their kind hospitality in the field.

References

- Ahn, T.K., Ostrom, E., Walker, J., (2009) "Common Pool Resource Experiments with Subjects from 41 Countries" *Ecological Economics*, submitted.
- Alcamo, J., J.M. Moreno, B. Nováky, M. Bindi, R. Corobov, R.J.N. Devoy, C. Giannakopoulos, E. Martin, J.E. Olesen, A. Shvidenko, 2007, Europe. In *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 541-580
- Baláz, V. 2009. Riziko a neistota. Úvod do behaviorálnej ekonómie a financií. Veda, Bratislava 456p.
- Cameron, L.A. (1999). "Raising the Stakes in the Ultimatum Indonesia." *Economic Inquiry*, 37, 47-59.
- Brehm, J. – Rahn, W., 1997: Individual-level Evidence for the Causes and Consequences of Social Capital. *American Journal of Political Science* 41 (3), pp. 999-1023.
- Boyd, R. Richerson P.J., 1988. The Evolution of Reciprocity in Sizable Groups. *Journal of Theoretical Biology* 132. 337-56.
- Cardenas, J.-C. (2001). "How Do Groups Solve Local Commons Dilemmas? Lessons from Experimental Economics in the Field." *Environment, Development and Sustainability*, 2 (3-4), 305-322.
- Cardenas, J.-C., Ahn, T.K., & Ostrom, E. (2004). "Communication and Cooperation in a Common-Pool Resources Dilemma: A Field Experiment." In S. Huck (ed.), *Advances in Understanding Strategic Behavior: Game Theory, Experiments and Bounded Rationality*(pp. 258-285). New York: Palgrave.
- Cardenas, J.-C., Stranlund, J.K., & Willis, C.E. (2000). "Local Environmental Control and Institutional Crowding-Out." *World Development*, 28(10), 1719-1733.
- Cardenas, J.-C., & Ostrom, E. (2004). "What Do People Bring into the Game? Experiments in the Field about Cooperation in the Commons." *Agricultural Systems*, 82(3), 307-326.
- Cardenas J.C., Janssen M. A. and Bousquet F., (forthcoming), Dynamics of Rules and Resources: Three New Field Experiments on Water, Forests and Fisheries, in List J. and Price M. (eds), *Handbook on Experimental Economics and the Environment*, New York: Edward Elgar Publishing

- Cooper, D.J. (2006). "Are Experienced Managers Experts at Overcoming Coordination Failure?" *Advances in Economic Analysis and Policy*, 6(2), article 6 (Berkeley Electronic Press).
- Carpenter, J., Burks, S., & Verhoogen, E. (2005). "Comparing Students to Workers: The Effects of Social Framing on Behavior in Distribution Games." In J. Carpenter, G. Harrison, and J. List (eds.), *Field Experiments in Economics* (pp. 261–290). Greenwich, CT: JAI Press.
- Carpenter, J., Connolly, C., & Myers, C. (2007). "Altruistic Behavior in a Representative Dictator Experiment." Working paper. Middlebury, CT: Middlebury College.
- Dawes, Robyn M. Orbell, M.J. Kragt. A. 1986. Organising Groups for Collective Action. *American Political Science Review* 80: 1171-85.
- Frohlich, Norman, Oppenheimer J. 1970. I Get by with a Little Help from My Friends. *World Politics* 23, 104-20.
- Henrich, J., McElreath, R., Barr, A., Ensminger, J., Barrett, C., Bolyanatz, A., Cardenas, J.-C., et al. 2006. "Costly Punishment across Human Societies." *Science*, 312(5781), 1767–1770.
- Janssen. A. M.(2008). Evolution of cooperation in a one-shot Prisoner's Dilemma based on recognition of trustworthy and untrustworthy agents, *Journal of Economic Behavior & Organization* (2006), 65: 458-471.
- Janssen M. and Ostrom E., 2008, Turfs in the Lab: Institutional Innovation in Real Time Dynamic Spatial Commons, *Rationality and Society*, Vol. 20(4):371–397
- Janssen. M.A., Goldstone. R.L., Menczer. F. Ostrom. E., 2008. Effect of Rules Choice in Dynamic Interactive Spatial Commons, *International Journal of the Commons*, 2(2): 288-312
- Kluvankova-Oravska, T. Chobotová V., Banaszak I., Slavikova L. and Trifunovova S., 2009, From Government to Governance for Biodiversity: The Perspective of Central and Eastern European Transition Countries, *Environmental Policy and Governance*, 19: 186–196
- Levitt, S.D., List, J.A. (2007a). "What Do Laboratory Experiments Measuring Social Preferences Reveal About the Real World?" *Journal of Economic Perspectives*, 21(2), 153–174.
- Levitt, S.D., List, J.A. (2007b). "Viewpoint: On the Generalizability of Lab Behaviour to the Field." *Canadian Journal of Economics*, 40(2), 347–370.
- Levitt, S.D., List, J.A. (2008). "Homo Economicus Evolves." *Science*, 319, 909–910.
- List, J.A. (2004). "Young, Selfish and Male: Field Evidence of Social Preferences." *Economic Journal*, 114, 121–149.
- Ostrom, E., Walker, J. (1991). "Communication in a Commons: Cooperation without External Enforcement." In T.R. Palfrey (ed.), *Laboratory Research in Political Economy* (pp. 287–322). Ann Arbor: University of Michigan Press.

DRAFT version for ISNIE 2010. Please do not quote without the authors' permission!

- Ostrom, E., Walker, J., Gardner, R. (1992). "Covenants with and without a Sword: Self-Governance is Possible." *American Political Science Review*, 86(2), 404–417.
- Ostrom, E., Gardner, R., Walker, J. (1994). *Rules, Games, and Common-Pool Resources*. Ann Arbor: University of Michigan Press.
- Ostrom, E. 1998. A Behavioral Approach to the Rational Choice Theory of Collective Actions. *American Political Science Review* 92, No:1, 1-22.
- Potters, J., van Winden, F. (2000). "Professionals and Students in a Lobbying Experiment: Professional Rules of Conduct and Subject Surrogacy." *Journal of Economic Behavior and Organization*, 43(4), 499–522.
- Putnam, R. D., 1993: *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton University Press.
- Sobel, J., 2002: Can We Trust Social Capital? *Journal of Economic Literature* XL/March/, pp. 139-154.
- Sally, D. (1995). "Conversation and Cooperation in Social Dilemmas: A Meta-Analysis of Experiments from 1958 to 1992." *Rationality and Society*, 7, 58–92.
- Slonim, R., Roth, A.E. (1998). "Learning in High Stakes Ultimatum Games: An Experiment in the Slovak Republic." *Econometrica*, 66(3), 569–596.
- Sorman A. and Zikos D., 2009, Cyprus: Does water recognise borders? in *Methods and tools for environmental appraisal and policy formulation*, under THEMES Marie Curie, 35 pages, *in press*
- Sutter, M., Haigner, S., Kocher, M. G. (2005). Choosing the stick or the carrot? –Endogenous institutional choice in social dilemma situations, University of Cologne, Department of Economics.
- Zikos D., Kluvánková-Oravská T. and Sláviková L. Policy Experiments on Common Pool Resources: Innovative tools providing multi-dimensional insights. Experiences from three new EU Member States. In: Kluvankova-Oravska et al. forthcoming. *From Government to Governance?* Alfa Printing.
- Young OR. 2002. *The Institutional Dimensions of Environmental Change: Fit, Interplay and Change*. MIT Press: Cambridge, MA.