The conditional Homo cooperativus

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Conditionally cooperative or self-regarding? An assistant's of Devesh Rustagi, a post doc at ETH-Zurich playing the "Public Goods" game with a local herder in the Bale forests of Ethiopia. (Photo: Devesh Rustagi)

A postdoc from ETH Zurich has been conducting research to find solutions to cooperation dilemmas. His recent field research in the Bale Mountains of Ethiopia reveals that the degree of voluntary cooperation along with costly monitoring of free riding acts plays a crucial role in the successful management of common property forests.

The ground breaking work of Elinor Ostrom, last year's Nobel Prize winner in Economics, demonstrates that common property resources can be successfully managed by self-governing groups. This runs contrary to the conventional wisdom, which assumes that people will maximize their personal gain, resulting in the destruction of the commons. A large body of evidence drawn from economic experiments, however, suggests that

most people are more than “Homo economicus” and are willing to forsake their maximum possible self-gain in the favour of the maximum collective gain if others are also willing to do so. Researchers refer to this as conditional cooperation. Behavioural experiments in economics with students have revealed that this degree of willingness to cooperate depends strongly on the belief as to how other group members will behave (see box). Until now, however, no study has examined the prevalence of this behavior in the field and how it affects outcomes of cooperation dilemmas, such as commons management.

Experiments in the forests of Ethiopia

Devesh Rustagi, a postdoc from the Institute for Environmental Decisions at ETH Zurich, together with Stefanie Engel (ETH Zurich) and Michael Kosfeld (University of Frankfurt) examined conditional cooperation in a field experiment with pastoral communities. Rustagi visited many pastoral groups in the Bale region of Ethiopia where thousands of pastoralists live in the mountains, which are up to 3,700 metres high. They rely on the forest for their livelihoods, where they find food for themselves and their livestock, and can earn cash by selling forest products at the local market. However, the heavy reliance of local people on young and medium-sized trees led over time to the disappearance of such trees from the forest, leaving behind an old growth and dying forest.

To save the dying forests, the Ethiopian government with support from Deutsche Gesellschaft für technische Zusammenarbeit (GTZ) launched a forest management program, in which local pastoral groups were given legal rights to use and manage their forests as a common property resources. The responsibility for the forest administration, regulation of logging and livestock grazing, and the implementation of measures against rule violation were placed in the hands of the pastoral groups. The performance of each group in forest management was assessed

every five years by the forest department together with the local groups. This evaluation involves counting the number of medium-sized trees per hectare of the community managed forest – a good measure of the individual groups' success in forest management given that forests were found to be lacking in such trees in the pre-program period. Interestingly, the team found a lot of variation in the performance of groups indicating that groups differ in their success in managing their commons.

The presence of cooperation dilemma in the field and tremendous variation in the forest management outcome provided the ideal starting point to examine if the propensity of the pastoral groups for conditional cooperation along with other factors could account for the success of individual groups in the management of their forest commons. Rustagi spent two months in the Bale forests visiting 49 local groups in a difficult terrain. Together with a local assistant, he explained the basic principles of the "Public Goods" game which simulates a classical cooperation dilemma to the pastoralists in their native language. During the game, Rustagi gave each participant six Ethiopian birr, which is the equivalent of a day's wage. The participants then had to decide whether to keep the money for themselves or contribute it for the provision of the public good. Every Birr put into the public good was multiplied by 1.5 and divided equally among two players in a group, irrespective of their individual contributions.

The players thus stood to make the biggest profit if both of them contributed their entire endowment of six Birr to the public good. However, if a participant's contribution to the public good was not reciprocated by the other player, she received only 0.75 Birr from the every Birr she invested in the public good: this created a cooperation dilemma.

Two versions of the game were played: first, the participant had to

decide simultaneously on her own contribution to the public good without knowing the contribution of the other participant in her group. The second decision was sequential and the participant had to indicate her own contribution having seen the contribution of the other player in her group. A participant was identified as a "conditional cooperator" if his contribution to the public good matched in the contribution of her fellow player; a free rider, on the other hand, consistently contributes zero to the public good, regardless of what her team-mates decide to do.

Of the 679 people who took part in the study, 231 behaved as conditional cooperators and an additional 79 as weak conditional cooperators. 78 players behaved as free riders, pocketing the majority of the money themselves. Apart from 15 altruists and 20 hump-shaped players, no clear pattern could be discerned for 256 players. At the group level, the proportion of conditional cooperators varied from zero to 88 percent.

More than a flight of fancy

Rustagi compared the distribution of conditional cooperation in various groups in statistical analyses with the data on the forest performance by individual groups. The number of young trees were much higher in forests managed by groups with higher proportion of conditional cooperators – for Rustagi a clear indication that conditional cooperation is more than just a flight of fancy on the part of behavioral economists: "The results of the game mirrored the actual behaviour of the pastoralists in their respective groups. We clearly demonstrated that the willingness to cooperate depends on the expectation that other fellow human beings will also cooperate."

The results also revealed a negative correlation between the number of conditional cooperators and free riders: the more conditional cooperators there are in a group, the fewer individuals there are who behave in a

purely selfish manner. Rustagi's explanation for this is that cooperative group members invest more time in monitoring their forest. His study reveals that conditional cooperators spent up to 32 hours a month monitoring their forest; free riders spent only 22 hours. Consequently, free riders are more likely to be exposed in cooperative groups, thereby deterring potential free riding acts of rule violation. "this monitoring provides a crucial mechanism to explain why groups with higher proportion of conditional cooperators are more successful at managing their commons", concludes Rustagi.

Taking intrinsic factors into account for commons

It is for the first time that the results in a field experiment support the evidence found in lab experiments that conditional cooperation plays a key role in overcoming cooperation dilemmas – even after taking into account other factors, such as group size, elevation, social and economic heterogeneity in groups, and the distance of groups from the nearest market. Moreover, the findings of the paper published in *Science* are also consistent with the theory of "gene-culture coevolution". This theory predicts a greater degree of cooperation in groups where non-cooperative behaviour is penalised.

Rustagi believes that his results could be channelled into policy design with support from development organisations: "We've shown that it is not enough to consider incentives just for the selfish players while designing commons management programs, but intrinsic factors like the cooperative behaviour of the individual group members also have to be taken into account". The aim, according to Rustagi, is to specifically design institutions that boost the willingness to cooperate and eliminate incentives for free riders through self-organised monitoring, for instance.

The dilemma with public goods

Cooperation is the key to human species. Be it conserving biodiversity, preventing climate change, tax payment, recycling waste, helping the poor and unemployed, all require collective action from hundreds and thousands of people. Take public transport, for instance: if everyone buys their tram ticket, the system works perfectly for all; but for individuals it is advantageous to travel without a ticket. However, this self-interest could eventually lead to the collapse of the public transport system. This free riding is a problem in many different areas, and the fight against climate change is no exception. Evolutionary biologists, psychologists and economists are therefore researching which factors cause people to forego a short-term advantage for themselves in favour of a community. With this in mind, they have devised games that can be used to measure the degree of cooperation.

More information: D. Rustagi, S. Engel & M. Kosfeld: Conditional Cooperation and Costly Monitoring Explain Success in Forest Commons Management. *Science* 12 November 2010: Vol. 330. no. 6006, pp. 961 - 965, DOI: 10.1126/science.1193649

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