

The best protection against my unforeseeable small-scale disasters is to take immediate action

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Computer simulations show how unforeseeable and small-scale disasters can motivate individuals to invest in counter-measures. Without quick action against climate change events like the flooding of Sankt Goarshausen on the Rhine in 2013 will occur more frequently. Credit: 123RF/andreyshevchenko

Climate change will have consequences—but when these will occur and how severe they will be cannot be precisely determined. Perhaps it is this uncertainty that will encourage people to act more quickly to prevent climate change. This is what the results of computer simulations by scientists at the Max Planck Institute for Evolutionary Biology in Plön, the University of Toronto and Geomar in Kiel suggest.

All of humanity must participate in the fight against [climate](#) change. People and countries must cooperate with each other if they want to at least limit the consequences of the man-made impact that increases temperature. A difficult task, as demonstrated by the many climate conferences, since ultimately, people have to forego direct profits—for only potential benefits in the distant future.

Scientists are studying the preconditions under which people waive individual benefits in favour of the public good with the aid of so-called "public good games" in which the subjects can earn or lose real or virtual money depending on their behaviour strategy. In their new theoretical study, the researchers have studied the most suitable behaviour strategies for dealing with repeatedly occurring negative events. The aim is to provide information as to how individuals can be persuaded to pay the costs to reduce smaller-scale disasters that cannot be precisely predicted.

In the simulation, virtual players receive a defined sum of money, which they can pay into a common account during the course of several rounds of the game. The account represents the costs that are needed from real individual willing to pay for climate protection measures. In the game, the researchers simulate the negative consequences of global warming by withdrawing money from the virtual players at random points in time if funds are insufficient in the common account. Unlike many other public good games where loss is final, herein the players can lose a portion of their wealth, thus being able to contribute in later rounds of the game. However, they do not know when disaster will strike and exactly when

they should pay, and how much. All players only consider their own benefit; the public good plays no part for them.

Simulations showed that player should help prevent loss for themselves and the other players by making contributions. "Under most conditions, it is advantageous for each individual player to pay into the common account as early as possible, especially under uncertainty – such that no one can predict when they will be threatened with a loss. In this way, everyone plans for the future and as early as possible—regardless of how much money they have available," Maria Abou Chakra, the lead author of the study, explains. Players whose fortune is smaller than that of their co-players can also profit from contributing early under certain circumstances.

Simulation mimicks climate change

The conditions of the [game](#) reflect the predicted development of the Earth's climate. Most climate researchers agree that we are not threatened with one single major disaster in the remote future if we fail to achieve our climate goals. To a far greater extent, climate change will progress continuously in many small stages. "Our results indicate that the most effective way of protecting yourself against climate change is to become involved and help reduce carbon dioxide emissions as early as possible. In this way, each individual person minimize their losses. Those who wait too long pay more," explains Traulsen from the Max Planck Institute for Evolutionary Biology.

While in the simulation, all players are aware that a disaster is looming, in reality, this is not the case. It is therefore essential that people are informed about the short- and long-term consequences of [climate change](#) . However, if for example a warning is merely given for some climate disaster that may occur in 50 years' time, this could unintentionally reduce the level of willingness to invest in counter-measures today.

Instead of emphasising a climate strategy extending until the middle of the century or even further into the future, shorter-term, more modest intermediate goals could be discussed. "In this way, rational individuals are more likely to be persuaded to join the fight against [disasters](#), since they would then already profit from their contribution in the short or long term," Traulsen explains.

More information: Maria Abou Chakra, Silke Bumann, Hanna Schenk, Andreas Oschlies, and Arne Traulsen, Facing uncertain climate change, immediate action is the best strategy. *Nature Communications*; 2 July, 2018

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