

## Background Information on the Data collected in the NATCOOP project

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The NATCOOP project set out to study how nature shapes the preferences and incentives of economic agents and how this in turn affects common-pool resource management. Imagine a group of fishermen targeting a species that requires a lot of teamwork to harvest. Do these fishers become more social over time compared to fishers that work in a more solitary manner? If so, does this have implications for how the fishery should be managed?

To study this, the NATCOOP team travelled to Chile and Tanzania and collected data using surveys and economic experiments. These two very different countries have a large population of small-scale fishermen, and both host several distinct types of fisheries. Over the course of five field trips, the project team surveyed more than 2500 fishermen with each field trip contributing to the main research question by measuring fishermen's preferences for cooperation and risk. Additionally, each fieldtrip aimed to answer another smaller research question that was either focused on risk taking or cooperation behavior in the fisheries.

The data from both surveys and experiments are now publicly available and can be freely studied by other researchers, resource managers, or interested citizens. Overall, the NATCOOP dataset contains participants' responses to a plethora of survey questions and their actions during incentivized economic experiments. It is available in both the .dta and .csv format, and its use is recommended with statistical software such as R or Stata. For those unaccustomed with statistical analysis, we included a video tutorial on how to use the data set in the open-source program R.

The dataset is accompanied by a codebook and the copies of the questionnaires, procedural scripts, and graphics used during the workshop sessions that were hosted in the respective fishing communities. The codebook contains information about how the survey answers and experiments are labeled and coded, which makes it easier to use and understand the data. The codebook has the following general structure: the variable names start with either a 'v', 'q', 'e', or 'p' indicating their type, which is then followed by a 3-digit number.

- The variables coded with 'v' contain general information regarding the field trip or workshop session such as the date or the location of the village.
- Variables coded with 'q' are responses to the survey questionnaires. These variables contain demographic information such as the age, gender and family situation of the participant, but also more detailed information regarding their fishing activities.
- The variables coded with 'e' contain the participants' actions during the economic experiments.





- The variables coded with 'p' contain the information on the panel structure of the dataset

To further understand how a variable was measured, it is possible to look for the variable name in the questionnaire. For the main experimental variables the graphics and procedural scripts are also available. The filename of each graphic contains the variable name of the main variable they were used to elicit.

The remainder of this document introduces the two field sites visited by the NATCOOP teams and provides more detailed information on the surveys and experiments that were conducted in each field trip.

### **Tanzania – Lake Victoria**

The NATCOOP project featured three field trips to the Tanzanian shore of Lake Victoria. Lake Victoria is the biggest lake in Africa and plays a crucial role in the regional economy. The lake's fisheries are central to the livelihood and food security of over four million people spread over Tanzania, Kenya and Uganda. Importantly, climate change, rapid population growth, and overfishing threaten the future of the fisheries at Lake Victoria. To ensure the fisheries' sustainability, researchers and fisheries managers need to understand why fishermen engage in non-sustainable practices such as overfishing or the use of illegal gear, and how to regulate a fishery when the ability to control and enforce regulation is limited.

#### **First field trip to Tanzania (TZ1)**

The first field trip to Tanzania took place in April 2017. During the fieldtrip, 25 workshop sessions were held at 17 different landing sites around Lake Victoria. The team consisted of Florian Diekert and Stuart Kininmonth from Heidelberg University as well as four researchers from the Tanzania Fisheries Research Institute (TAFIRI), namely Joseph Luomba, Elizabeth Mlahagwa, Julieth Tibanywana, and Winnie Muangi.

Each session consisted of five choice experiments and a survey. The choice experiments were used to measure participants risk-, time-, and social preferences. The first two experiments intended to investigate participants' risk preferences and were conducted in the form of an investment game. First, participants had to choose whether to invest points into a risky or safe option. Conditional on the flip of a coin, the points invested in the risky option were either tripled or lost. The points in the safe option were guaranteed, but there was also no chance that they were increased. Participants that are more tolerant to risk presumably invest more points into the risky option. The choice made by the participant in this experiment is stored in the variable e003.

The second experiment (e004) was very similar, but instead of a coin flip, the participants had to draw a marble out of a bag filled with both white and black marbles. If they drew a white marble, the points in the risky option were tripled. If they drew a black marble, the points were lost. Again, points in the safe option were guaranteed. The participants were not told how many black and white marbles there were in the

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bag, so the odds of success were ambiguous. This ambiguity perhaps resembles the fisher's job more closely, as they do not know the probability that a fishing trip will be successful.

The third experiment measures the participants' social preferences (e005). The participants could distribute six points between a private account and a group account. The group account was shared with three other participants in the same session. The participant could keep the points in the private account for themselves. The points they put in the group account were doubled and shared equally among all four members, such that everyone would get half a point. The group would be better off if everyone put their points in the group account, however each individual gains most by putting the points in the private account. A participant with social preferences would put more points in the group account in order to help the other participants.

The fourth experiment serves to study the risk-gain tradeoff when cooperating with others (e006). To this end, we employ a stag-hunt game. This game has two Nash equilibria, where both players choosing "X" yields the highest payoff, but if there is miscoordination, (such that one player chooses "Y" and the other chooses "X") choosing "Y" is better than choosing "X". Both players choosing "Y" is therefore the risk-dominant, but not pareto-dominant, Nash equilibrium. In treatments, the payoffs associated with the different choices are changed so that choosing "X" becomes more risky in on treatment, and more lucrative in a another treatment.

Finally, the experiment to elicit time preferences used a simple so-called "money now or later" design (e013). Participants had to choose whether they wanted to receive their money earlier or later (early meant after two days, later meant after two weeks, in both cases money was sent by mobile phones). Participants had to choose six times (a dice roll determined later which row was being paid out), the amount that participants would get in two weeks would stay the same, while the amount that they would get in two days increased.

The measurements of social and risk preferences are used in the following paper:

- *“Does nature shape risk- and social preferences? Evidence from Chile, Norway and Tanzania”* by Florian Diekert and Robbert-Jan Schaap.

## **Second field trip to Tanzania (TZ2)**

The second field trip to Tanzania took place between February 14th and March 13th of 2018. It was carried out by Florian Diekert and Tillmann Eymess, in cooperation with researchers from TAFIRI including Joseph Luomba, Elizabeth Mlahagwa, Julieth Tibanywana, and Halima Adam. The trip consisted of 27 sessions in 19 different landing sites at Lake Victoria. One of the goals of this field trip was to repeat the measurement of risk and social preferences with the same participants. About half of the participants from the first field trip were re-sampled for the second data collection.





Similar to the first field trip, the researcher team conducted a survey with questions on demographics and fishing related topics. The survey contained additional questions on compliance with official fisheries rules and management.

The team also conducted a more elaborate experiment to answer an additional research question: “To what extent can social information and the ability to punish behavior promote cooperative behavior in a community?” This type of research has a clear link to fisheries management in developing countries as the capacity to enforce rules is often low and fisheries managers have to rely on communal self-management to achieve sustainable outcomes. For example, if fishers in a community agree that using dynamite or poison for fishing is a bad thing, they might refrain from using these methods, and perhaps even be willing to punish others for breaking these informal regulations. The main outcome of this experiment is stored in the variable e031, however all variables between e023 and e092 contain relevant data for the experiment.

The data on risk and social preferences is used in the paper:

- “Does nature shape risk- and social preferences? Evidence from Chile, Norway and Tanzania” by Florian Diekert and Robbert-Jan Schaap.

The data from the experiment on social information and punishment is used in the papers:

- “*The Creation of Social Norms under Weak Institutions*” by Florian Diekert, Tillmann Eymess, Joseph Luomba and Israel Waichman
- “*Dissecting Social Norms of Cooperation*” by Tillmann Eymess
- “*Captains of Change*” by Tillmann Eymess and Philipp Händel

### Third Field trip to Tanzania (TZ3)

In this final field trip, conducted between the 1st and 31st of March 2020, 36 workshop sessions were conducted at a total of 22 landing sites. The team consisted of Florian Diekert, Tillmann Eymess from Heidelberg University, Philipp Händel from Kassel University, and Joseph Luomba, Elizabeth Mlahagwa, Halima Adam, and Salma Emmanuel from TAFIRI and the University of Dar-es-Salaam. Similar to the prior field trips, the field research contained a survey and two economic experiments.

The first experiment was designed as a natural extension to the findings of the second field trips. Does the power of social norms to induce a pro-social behavioral change also hold when decisions are made by teams? Hereby, the research directly speaks to the communal context of fishing at Lake Victoria and addresses the relevant organizational structures under which fishermen extract the resource.

In a second experiment, a similar research question was posed with respect to investment decisions under risk. Again, the project studies questions related to the uncertainties faced by fishermen that have little insurance possibilities but have to depend on the lake on a subsistence level.

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The data from this third field trip is used in the following papers:

- “*Changing Collective Action*” by Florian Diekert and Tillmann Eymess
- “*Captains of Change*” by Tillmann Eymess and Philipp Händel

## Chile

The NATCOOP project featured two field trips to Chile. During these field trips, the research team covered a distance of 1,300km along the Chilean pacific coast. They visited landing sites between the small village of Tubul in the central-southern Biobio region and the city of La Serena in the northern Coquimbo region. The coastal waters of Chile are host to a productive and diverse ecosystem, which supports Chile’s status as a top ten exporter of fish and fish products. However, catches fluctuate strongly from year to year. Therefore, the research in Chile was aimed at how the natural variability of a resource is related the fishers’ their preferences for risky and cooperative behavior.

### First field trip to Chile (CL1)

The first field trip to Chile took place between June 19 and July 10 of 2017. During the fieldtrip, 28 workshop style sessions were held at 16 different landing sites. The team consisted of Robbert-Jan Schaap and Stuart Kininmonth from Heidelberg University and three researchers from the Chilean Pontifical Catholic University of Valparaiso, namely Exequiel Gonzalez-Poblete, Karin Loreto Silva Aedo and Jose Marino.

The first three experiments were the same as in the first field trip to Tanzania. Risk preference was measured with the two investment games, where participants had to divide points between a risky and safe option (e003 and e004). Social preference was measured using a public good game, where participants are paired in groups and had to distribute points between the group account and the private account (e005).

The fourth experiment concerns donation behavior. Some participants were given the role of “dictator” and others that of “recipient”. The dictator starts the experiment with an endowment of points, whilst the recipient starts with nothing. The dictator can then choose to donate points to the recipient and fairly divide the points between them, or to keep all the points (e174). This experiment also contained a risk element; the donation might not reach the recipient. Two types of risk were introduced and compared. Either a third participant had the option of ‘stealing’ the donation, or the donation does not reach its destination due to a random event. Afterwards questions were asked about the beliefs the people had about the other’s donation behavior and why they chose to donate.

To see how the collected data is used, you can have a look into the following papers:

- *Does nature shape risk- and social preferences? Evidence from Chile, Norway and Tanzania* by Florian Diekert und Robbert-Jan Schaap (also TZ-Data is used)

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## Second field trip to Chile (CL2)

The second field trip to Chile took place between October 30 and November 23 of 2018 and included 26 sessions in 11 landing sites, some of which were already visited in the previous field trip. This field trip was conducted by Florian Diekert, Robbert-Jan Schaap and Sarah Henriquez from Heidelberg University, and Exequiel Gonzalez-Poblete, Karin Loreto Silva Aedo and Jose Marino from the Pontifical Catholic University of Valparaiso.

This survey used in the second field trip contained many of the questions asked in the previous year. Additionally, the survey contained some more detailed questions regarding the financial circumstances of the fishers, how much savings they need and their expectations about fishing in the coming year. These questions related to the research topic specific to this field trip: “How do fishers prepare for, and deal with fluctuations in their income”.

Small-scale fishers deal with a lot of risk, some years they have bad catches or the price is low, also the chance of an accident at sea is quite high. If fishers are not prepared for such events, and if they are unable to earn additional income, they can experience severe hardships. The goal of this field trip was to better understand how regulations on the amount of fish that can be harvested, effect the fishers’ ability to deal with these bad times.

The first two choice experiments in CL2 were two experiments already conducted in CL1, namely experiments 1, in which we measured risk preference through the investment game with the coin-flip (e003), and experiment 3, which measured social preferences with the public good game (e005).

The last experiment in CL2 was used to measure a specific aspect of risk preference that is particularly relevant for savings behavior. The participants had to choose whether to would prefer to take a gamble after they just lost or won a previous lottery. So, do they prefer to take a risk when they are richer, or when they are poorer? (e182)

To see how the collected data is used, you can have a look into the following papers:

- *Risk, restrictive quotas, and income smoothing* by Robbert-Jan Schaap, Exequiel Gonzalez-Poblete, Karin Loreto Silva Aedo and Florian Diekert
- *The prevalence of prudence in a risky occupation* by Robbert-Jan Schaap

