Resolving conflicts between food security and biodiversity conservation under uncertainty

Sprawozdania

Informacje na temat projektu

ConFooBio

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Strona internetowa projektu

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Periodic Reporting for period 4 - ConFooBio (Resolving conflicts between food security and biodiversity conservation under uncertainty)

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Podsumowanie kontekstu i ogólnych celów projektu

Conflicts between food security and biodiversity conservation are increasing in scale and intensity and have been shown to be damaging for both biodiversity and human livelihoods. Uncertainty, for example from climate change, decreases food security, puts further pressure on biodiversity and exacerbates conflicts.

The aim of the ConFooBio project is to develop novel approaches and models that predict solutions to conflicts between biodiversity conservation and food security under uncertainty. The objectives of ConFooBio are to 1) characterise and analyse real-world conservation conflicts impacted by uncertainty over time; 2) develop new approaches to collecting data in the field based on experimental games that explicitly incorporate conflicts and uncertainty; and 3) produce and test a flexible social-ecological model, applicable to real-world conflicts where stakeholders interact with each other and operate under conditions of extreme uncertainty.

The project has importance for society at large because managing natural resources often results in conflict between those stakeholders focussing on improving food security and those focussed on biodiversity conversation. ConFooBio will illuminate resolutions and mitigation strategies to such conflicts by showing how to enter processes that protect biodiversity and secure livelihoods. In this project, we have developed a practical, transparent and flexible model for the sustainable future of natural resources that is also robust to conflicts and uncertainty (e.g. climate change); this model will be highly relevant for environmental negotiations among stakeholders with competing objectives from local to global levels.

Prace wykonane od początku projektu do końca okresu sprawozdawczego oraz najważniejsze dotychczasowe rezultaty

The ConFooBio project has worked on three main themes, 1) characterise and analyse real-world conservation conflicts impacted by uncertainty over time; 2) develop new approaches to collecting data in the field based on experimental games that explicitly incorporate conflicts and uncertainty; and 3) produce and test a flexible social-ecological model for conservation conflict management.

1) Our time series analysis of conservation conflicts has focused on geese and cranes in Northern Europe assessing management responses to increasing populations. Our research shows a mismatch between population changes and the management responses (i.e. compensation payments, scaring, lethal control and hunting) with a time lag of one to three years for the management action to adapt to changes in the population numbers. Our findings highlight the need for more adaptive and timely responses of management to changes in population numbers so as not to increase social conflicts and jeopardize the status of wildlife populations and local livelihoods. We have then formalised our conflict approach by developing a novel framework to determine the level of intensity of a given conflict and the drivers that provide the evidence for changes in the intensity levels. Furthermore, we have investigated carnivore management (specifically lynx in Norway) over time and identified a complex governance system to balance the sustainability of lynx populations and farming (specifically sheep farming and reindeer herding).

2) We have developed and implemented over 300 game workshops with over 900 stakeholders across Scotland, Gabon, Madagascar, Kenya and Tanzania to evaluate the impacts of different conflict interventions (subsidies, compensation payments) on stakeholders' decision making (scaring and killing of wildlife, deforestation as well as habitat conservation). These games take into account the uncertainty of where and when wildlife and forests occur and on which land parcels. Along with the games we have administered questionnaire surveys with the same participants across the same countries to identify key determinants of individual and group behaviour (values, attitudes, local perceptions of equity and trust, socio-demographics). The most important result is that a combination of payments with high levels of trust and decision making equity led to more pro-conservation actions and outcomes. Thus, the combination of economic and social factors together lead to more positive environmental outcomes than any factors on their own.

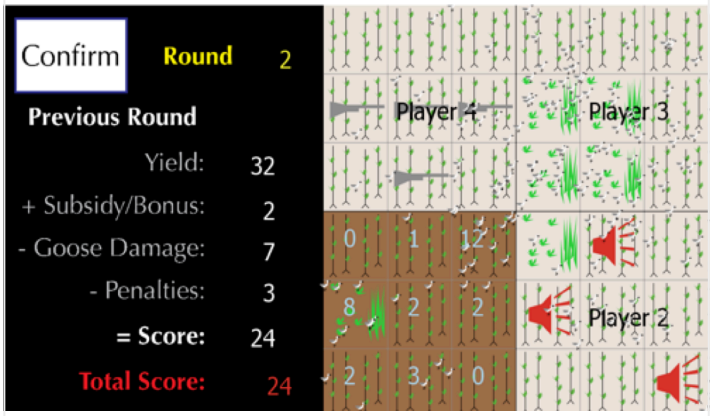
3) We have developed a novel modelling framework to predict wildlife management outcomes in the presence of stakeholder disagreement and conflict. Our new software for social-ecological modelling called Generalised Management Strategy Evaluation (GMSE) and underlying code is freely available as a package in the statistical software R and on GitHub and has been downloaded over 20 thousand times. The description of the package and its capabilities was published in the peer-reviewed journal Methods in Ecology and Evolution in 2018. We have now shown the broad and realistic applicability of the GMSE model by applying it to IUCN Red List species for which overexploitation is a thread and published this in the journal Ecology and Society.

Innowacyjność oraz oczekiwany potencjalny wpływ (w tym dotychczasowe znaczenie społeczno-gospodarcze i szersze implikacje społeczne projektu)

In our Generalised Management Strategy Evaluation (GMSE) model, we have developed and tested a novel application of genetic algorithms for social-ecological modeling. This allows stakeholders in the modeling framework to exhibit goal-orientated behaviour, to adapt their decision making to a dynamic ecosystem and wildlife population as well as to other stakeholders. This allows us to study the behaviour of stakeholders with conflicting goals, for example when one set of stakeholders aims to produce food and the other set aims to conserve biodiversity and wildlife populations. Thus, we have combined computer science with ecology and human behaviour research to develop an interdisciplinary modeling approach to tackle conflicts in biodiversity conservation and food security. The software is called Generalised Management Strategy Evaluation ("GMSE") and the underlying code is freely available as a package in the statistical software R and on GitHub.

We have also developed a novel game-based approach using tablet computers, where people make decisions about wildlife populations that damage their agricultural crops. Decisions range from scaring to killing to setting aside habitat for conservation under treatments of compensation payments and subsidies. These games are accessible to illiterate and innumerate participants and capturing spatial and temporal dynamics of wildlife and decisions made to help people voice their needs and

stimulate discussion on their motives and decision processes in conflicts between conservation of biodiversity and food production and security.



Experimental games played on tablets

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