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**"Experiments on common-pool resources: A tool for policy evaluation  
in water governance systems?  
Empirical evidence from Central and Western Asia"**

**Master thesis for the study programme:  
Integrated Natural Resources Management**

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**Abstract**

*For this dissertation, economic field experiments on water governance have been conducted in Kyrgyzstan and Jordan. A standardised experiment – the Irrigation Game – was used. The experiment depicts an asymmetric common-pool resource dilemma, which puts resource users (farmers) in a situation, where they have to take economic decisions about the use of water. The experiment was used to test the difference between the effect of exogenous institutions (sets of rules crafted outside of the system in question) and endogenous institutions (sets of rules crafted with the participation of the resource users) on the behaviour of water users. The experiment was conducted in different water governance systems: two communities where water has private good characteristics and is governed under a market-like governance structure (both in Jordan), and three communities where water has common-pool resource characteristics and is governed under a hybrid governance structure (two in Kyrgyzstan and one in Jordan). While the overall output of the system was not significantly enhanced by the introduction of institutions, the asymmetry between the participants was mitigated by the introduction of institutions. In particular endogenous institutions in the experiments led to a more fair distribution amongst the resource users. This effect was significantly more pronounced in hybrid governance structures than in market-like governance structures. The difference in the performance of the experiment between the governance systems proved to be statistically significant, while the difference between the countries did not. The results support the argument that endogenous institutions are more important in common-property regimes. Furthermore, this study shows that experiments can be used as a tool to contribute to understanding natural resource governance systems and evaluate respective policies.*

## 6. Conclusion

This study answered the research questions posed by comparing the results of the experiments (the irrigation game) conducted in five different communities in Kyrgyzstan and Jordan. To that end, a theoretical framework was derived, comprising three levels of analysis. On the level of attributes of the resource, the type of good as well as properties of transactions are identified. On the institutional level the intervention (the experiment) took place; endogenous and exogenous institutions were introduced. Finally, on the governance level, property regimes and governance systems are described. The transactions in question are provisioning and appropriation of irrigation water, since they are modelled by the experiment.

The experiments were conducted in five communities, two of which in Kyrgyzstan and three in Jordan. The two communities in Kyrgyzstan and one in Jordan are categorised by the framework developed as hybrid governance systems in combination with a common property regimes, where irrigation water and infrastructure classify as common-pool resources. The other two communities in Jordan are categorised as market governance systems in combination with private property regimes, where irrigation water and infrastructure are classified as private goods. In each community the experiment was conducted with ten farmers, who used water from the source investigated for the irrigation of their crops. The data generated by the experiment was complemented by a questionnaire as well as qualitative data collected about the cases. The data was analysed using descriptive and explorative statistics as well as mixed-effects multi level linear regression analysis.

The results of the experiment showed that endogenous institutions enhance the performance of irrigation systems where water is a common-pool resource and which are governed by a hybrid governance structure. Asymmetry was reduced considerably. For the Jordanian cases where water was classified as a private good and which was governed under a private property regime with a governance structure close to market, the introduction of the rules, both the endogenous and exogenous did not change the performance of the system significantly. The differences between the governance structures were significantly more pronounced than between the countries; a fact which seems surprising, considering the great differences in

framework conditions, water availability and culture between Kyrgyzstan and Jordan.

In summary, the main findings of this study are:

- Endogenous institutions lead to a more equitable distribution of water in a field experiment on irrigation with asymmetric access to water;
- In communities, where water is governed under a governance system tending towards a market structure, water distribution proved to be significantly more equitable than in communities where water is governed under a hybrid governance system, before the introduction of exogenous and endogenous institutions;
- In communities, where water is governed by a hybrid governance system, the effect of endogenous institutions is significantly more pronounced than in communities where water is governed under governance system tending towards a market structure;
- In the field experiments conducted, the governance system explains the difference in performance between institutions, but not the country where it was conducted.

The findings point to the conclusion that policies that encourage the participation in rule crafting can enhance the performance of water governance systems. This holds in particular true for hybrid governance systems, where water is a common-pool resource. However, where water had the features of a private good and was governed by a market-like governance structure, the introduction of rules did not enhance the performance of the irrigation system significantly. Whereas endogenous institutions proved to be vital for hybrid governance systems, they are less influential in market governance systems. Furthermore, the findings prove that the irrigation game can capture patterns of behaviour of resource users beyond the incentives posed by the game alone. Resource users from different governance systems behaved differently. Therefore, the author concludes that field experiments can be used as a tool for policy evaluation.

In summary, the following main conclusions can be derived from the findings:

- Participation in the crafting of institutions can enhance hybrid water governance systems;
- In market governance systems institutions are less influential;

- Experiments can be used as tools to evaluate water policies.

The findings of this study can add to improve water governance and, thus, help to understand the global water crisis. Tailored institutions that encourage participation in rule crafting and communication can improve water governance in hybrid governance systems, whereas in market governance systems, careful water pricing might be more promising.

However, this study does not provide ready-made solutions to water governance problems. It can only showcase how different water policies (like the regulation of irrigation water by endogenous or exogenous institutions) can be tested and evaluated with the actual users of the resource in question. The findings of this study are limited to hybrid governance systems, where water has the features of a common-pool resource and market-like governance systems, where water is a private good. Additional research into more different water governance systems and into governance systems of other resources is necessary, in order to go beyond this limitations. Other variables that might influence the behaviour of participants should also be investigated, like gender, education, and the presence of state officials. Finally, a more comprehensive statistical analysis of the development of the distribution of water within the stages of the game could provide some additional insights about learning effects and the effects of the treatments on equity within the stages.