

Institutional Analysis of Food-Exchange Networks in the Ancient Eastern Mediterranean

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1 Part I: System Structure- Collective action

This is a diachronic case study of rainfed agricultural systems in the Eastern Mediterranean Basin, specifically focusing on the role of food-exchange networks in mitigating agricultural risk. The resource users considered include agropastoralists from multiple cultures spanning the past 10,000 years. The core social dilemma in this case study involves the potential for resource users to free-ride on public, social infrastructure. The key resources in this system are food and water. The key resource relevant to the commons dilemma faced by these communities is flows of food moving through social exchange networks.

1.1 The Commons Dilemma

- **Potential over-appropriation / poor coordination of appropriation:** The commons dilemma arises from the perverse incentives that food exchange networks create for individual resource users to try to maximize crop yields in any given year rather than minimize the variance in year-to-year food supplies. Exchange networks are intangible and only mobilized in times of food stress, and it is thus very difficult to detect over-appropriation until it is too late.
- **Potential under-provisioning of public infrastructure:** Exchange networks rely on the maintenance of social ties, in particular those with distant social groups and resource systems. But because food-exchange networks are irregularly mobilized there are few incentives to actively maintain these ties from year-to-year, especially as spatial scale increases.

1.2 Biophysical Context (IAD)

- **Natural infrastructure:** Natural infrastructure relevant to the commons dilemma are all aspects of the Mediterranean agroecosystem, in particular soil, crops, and livestock. Natural infrastructure is nearly always private and maintained on the household level. These infrastructure elements provide affordances for the transformation of water and nutrients into calories for the household.
- **Hard human-made infrastructure:** The hard human-made infrastructure relevant to the commons dilemma is road networks. Roads provide affordances for the movement of food and other goods between resource systems, and structure the topology of food-exchange networks.

1.3 Attributes of the Community (IAD)

- **Social Infrastructure:** The public, social infrastructure of exchange networks is the key feature of this case study. These networks provide affordances for the transmission of food between resource systems in times of resource stress. These networks operate on a variety of nested scales, from villages to the entire regions. The precise nature of these networks has changed over time, but include informal kinship networks, formalized redistributive palace economies, and institutionalized patron-client relationships.
- **Human Infrastructure:** Human infrastructure in Mediterranean agricultural systems involves knowledge of local agricultural risks, such as the fertility of certain soils or the

expected soil moisture on slopes with different aspects. It also involves past experience of rainfall variability and food supplies, and is drawn on by resource users every year to make cropping and stocking decisions in response to perceived risks.

1.4 Rules in Use (IAD)

Rules-in-use are unspecified in this case study. Specific rules are very difficult to infer from the archaeological record, and references to them in the historical record generated by classical authors are prescriptive rather than descriptive.

1.5 Summary

Properties of the resource users in this case study, particularly with respect to the ways they mobilize private infrastructure to mitigate variability in rainfall, have been remarkable stable over time. In contrast, the institutions responsible for providing and maintaining food-exchange networks have been quite variable over time, but all have had to make tradeoffs between the performance of those networks and their ease of maintenance. Networks that span greater social and spatial distances are the most effective at mitigating drought impacts, but resource users have greater incentives to free-ride, and are less likely to be caught, in these larger systems.

2 Part II. Dynamic Analysis - Robustness

Droughts are the primary shocks to the resources system in Mediterranean agriculture. Mobilization of natural and human infrastructure by resources users in the form of risk-minimizing strategies can mitigate the impact of small scale droughts, but fail in cases of spatially-extensive droughts or during runs of dry years. Exchange-network infrastructure must be mobilized in these cases. Conversely, runs of multiple wet years can sometimes act as a shock to these exchange networks, because the less often these networks are mobilized the less incentives resource users and infrastructure providers have to the pay costs required to maintain them.

3 Case Contributors

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