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“Can agroecological farming feed the world?  
Farmers’ and academia’s views”

## Diagnosing agroecosystems through interdependent networks of actors, actions and outcomes

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### Abstract

Scholars are faced with the challenge to explain the emergence of negative social and environmental phenomenon through numerous human and non-human components with multiple feedbacks in agroecosystems. The knowledge is lacking about how and to what extend the interaction of social actors and ecological components can facilitate or obstruct the achievement of desired outcomes in agroecosystems. This paper aims to clarify the interactions between social actors and ecological components by diagnosing the social and environmental outcomes of agroecosystems through multilayer interdependent of actors, actions, and outcomes. A prominent case is the Zayandeh-Rud river basin in Iran where its agroecosystem is crashing down due to a severe water scarcity.

Accordingly, we propose a Network of Action Situations and Outcomes (NASO) framework, adapted from the Institutional Analysis and Development (IAD) framework by incorporating elements from the Networks of Action Situations approach. We used qualitative and quantitative approaches to collect and analyse data and information from primary and secondary sources related to the case of Zayandeh-Rud river basin, Iran. We collected primary data and information through field observations, five in-depth expert interview, three focus-group discussions, four interactive workshops with the contribution of 126 persons from the water, agriculture, and environment sectors, farmers, and civil society. In addition, we conducted a questionnaire-based survey (N=156) from decision makers, experts and farmers at local, district, provincial and river-basin levels.

We diagnosed particular focal action situations and interdependent outcomes and actors using NASO framework. According to centrality metrics, water conflicts is the major outcome, tightly interconnected with focal action situations through feedback and impacts. Water conflicts are a growing consequence of other outcomes including inter-basin water transfer, less surface water available for irrigation, disagreement on irrigation water rights, loss to farmers’ income, food insecurity, and migration of farmers to cities. We demonstrate the importance of studying interdependent networks of outcomes against the background of interdependent networks of action situations and networks of actors in agroecosystems. This study provides key concepts and findings to determine potential transitional pathways towards sustainable agro-ecological systems for addressing food insecurity and environmental degradation at local and regional levels.

**Keywords:** Agroecosystems, institutional analysis and development, interdependency, network of action situations, water conflicts, Zayandeh-Rud basin

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