

Interactions between stakeholders and ecosystems: social networks, power, beneficiaries, and agents of change

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Understanding the benefits humans receive from ecosystems is a high priority in socio-ecological research. Several frameworks describing the delivery of ecosystem services (ES) have been proposed, and recently, an increasing attention is being given to the social component (i.e. the beneficiaries) of ES. Stakeholders do not access ES equally and consequently do not benefit the same way from ecosystems. Inequalities are explained by spatial characteristics (i.e. upstream and downstream beneficiaries of a watershed), interactions among ES (i.e. tradeoffs between the provision of multiple ES) and among stakeholders (i.e. tradeoffs between beneficiaries). Power relationships have an important role in ES tradeoffs. While there is an important body of literature dealing with power relationships and the access to natural resources, the concept of ES remains poorly related to those questions of equity and environmental justice. However, identifying power relationships is crucial to highlight the mismatch between stakeholders that highly depend on ES but that are excluded from their management and to design sustainable environmental policies that reduce social inequalities. This study aims to investigate the relationships between ES and stakeholders in a Peruvian watershed. Relevant stakeholders were identified through focus groups and semi-structured interviews. Two-mode Social Network Analysis was conducted based on stakeholders-ES interactions related to benefits received from ES (use and exclusion) and influence on ES (positive or negative effect on their level). Network structural properties were computed to analyze the nature and intensity of relationships. Results showed that stakeholders were clustered regarding the ES they interacted with. There was a mismatch between stakeholders depending on ES and stakeholders managing them. This study underline the importance of integrating such power asymmetries in environmental and socio-economic policies since stakeholders that strongly depend on ES are also likely to be deeply affected by global changes (climate change, economic transformation, increase of population, etc.).

Keywords: Power analysis, Ecosystem Services, Stakeholders, Social Network Analysis