



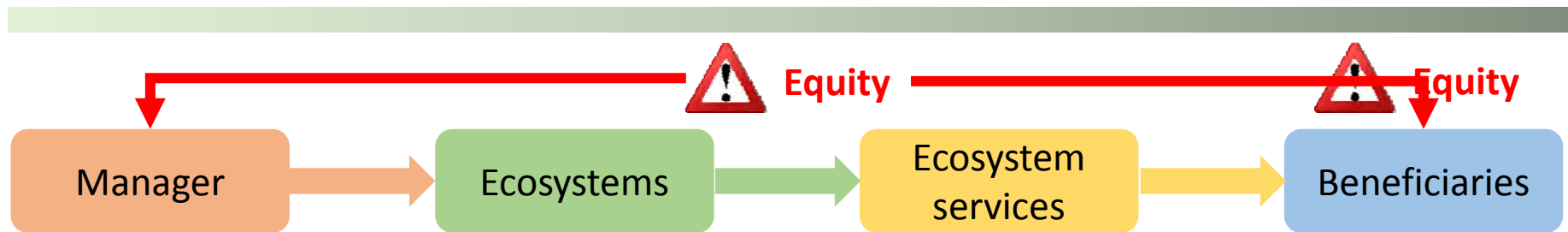
Interactions between stakeholders and ecosystem services: social networks and power

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Healthy ecosystems for resilient societies

Equity, Power and Ecosystem Services



- Stakeholders do not benefit equally from ecosystem services (Howe et al. 2014; Felipe-Lucia et al. 2015)
- Stakeholders play unequal roles in relation with ecosystem services (managers/beneficiaries) (Felipe-Lucia et al. 2015)
- Power asymmetries underpin these inequities
- The concept of ecosystem services is poorly related to the questions of equity, power and environmental justice (Ernstson 2013; Felipe-Lucia et al. 2015)



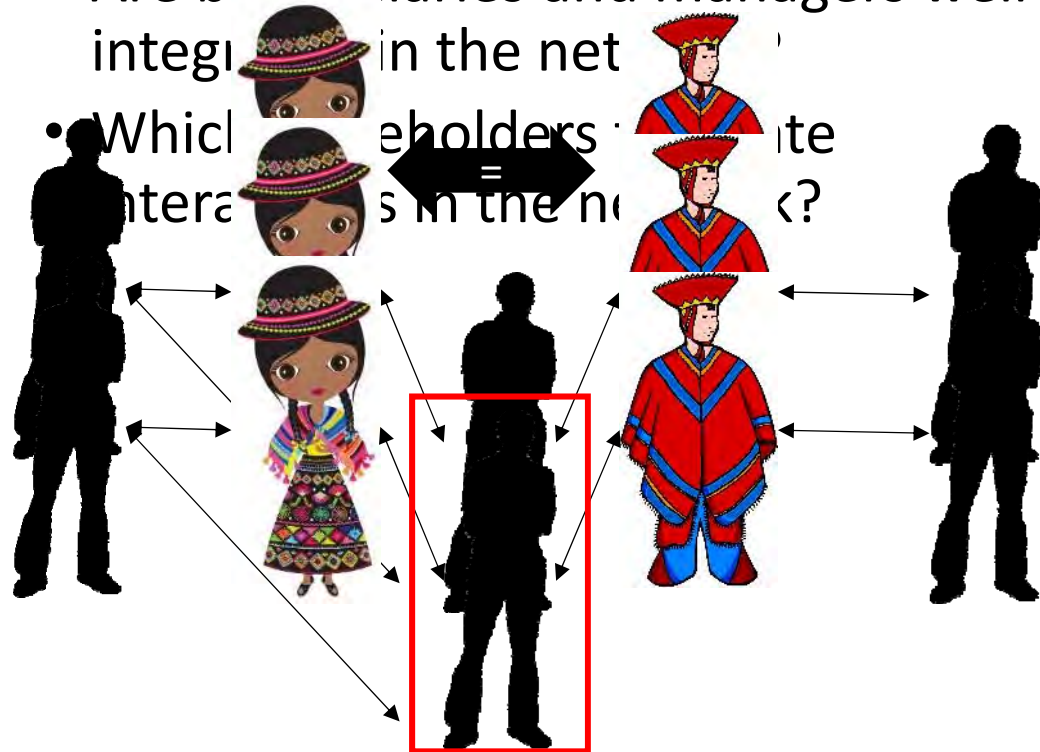
Social Network Analysis to analyze power asymmetries

- Social network analysis can be used to describe the social dimensions of ecosystem services (Roldán et al. 2015; Ernstson et al. 2008)
- Inequalities are explained by the interactions among stakeholders (Felipe-Lucia et al. 2015)
- The structure of the network captures the nature and the intensity of interactions...
 - Among stakeholders
 - Between stakeholders and ecosystem services



Questions

- What are the power asymmetries related to the benefits from and management of ecosystem services ?
 - Are beneficiaries also managers?
 - Are beneficiaries and managers well integrated in the network?
 - Which stakeholders interact in the network?

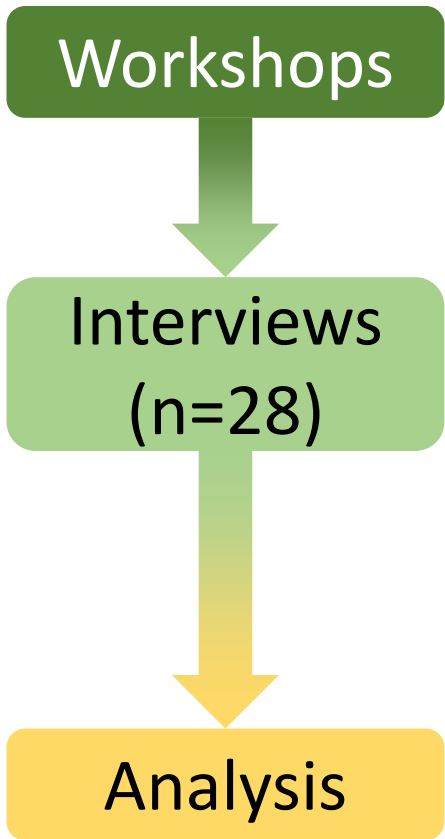


Study Site

- Andean watershed (Mariño), Peru
- 284 km²
- Agroforest mosaics
- Presence of a protected area (Ampay Sanctuary)
- Environmental conflicts (water scarcity, urbanization boom, mining activities)



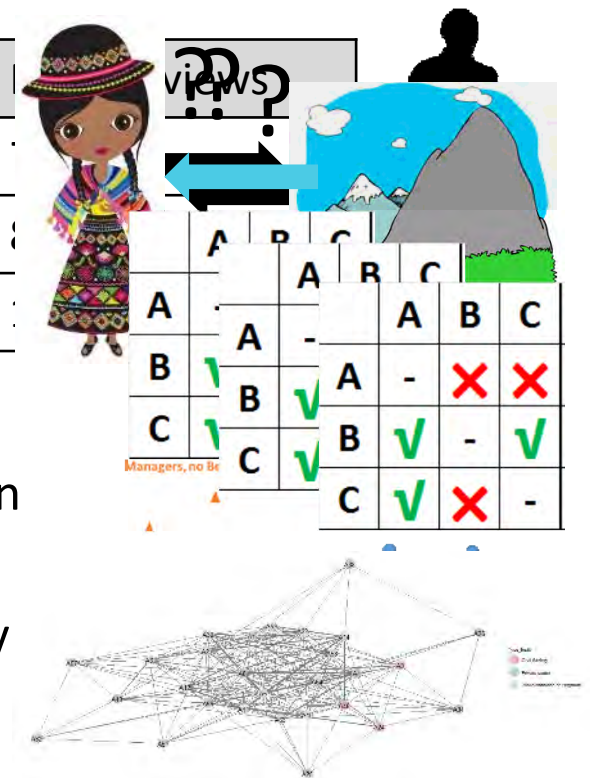
Methods



- Selection of ecosystem services
- Identification of stakeholders

• What services benefit each stakeholder?	
Type of stakeholder	
Civil society	
• What services do stakeholders manage?	
Private sector	
Public institutions	
• How do stakeholders relate?	

- Clustering of stakeholders based on benefits and management
- Network analysis (connections, key stakeholders, homophily)



Ecosystem services

- Selection of 8 services

**Agricultural
production**



**Medicinal
plants**



**Purification
of water**



**Water flow
regulation**



Sheet erosion



Mass erosion



**Regulation of
global climate**

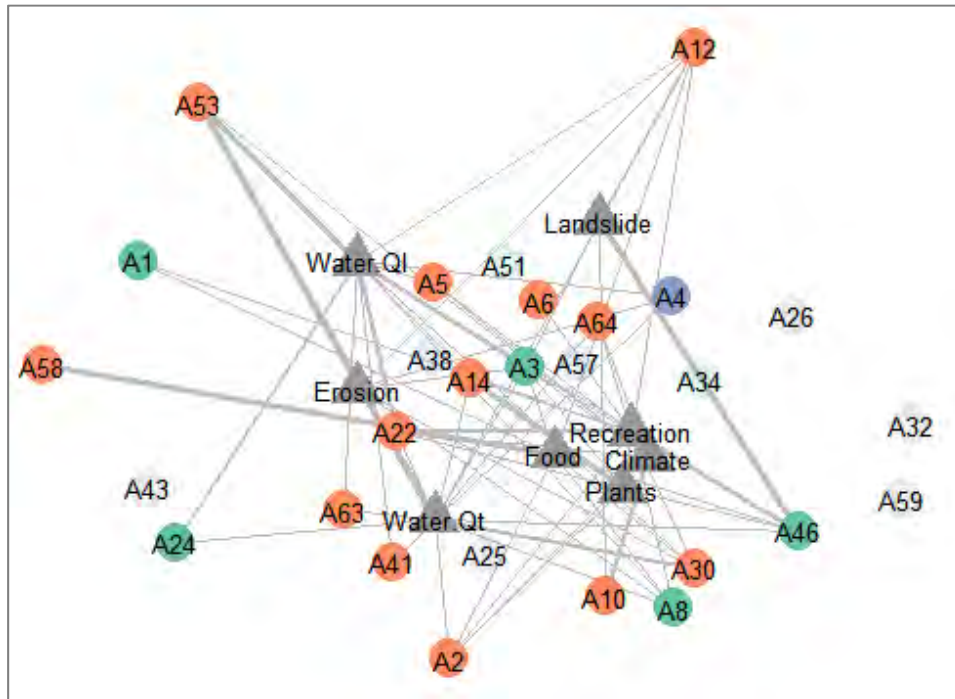


**Scenic beauty
and recreation**

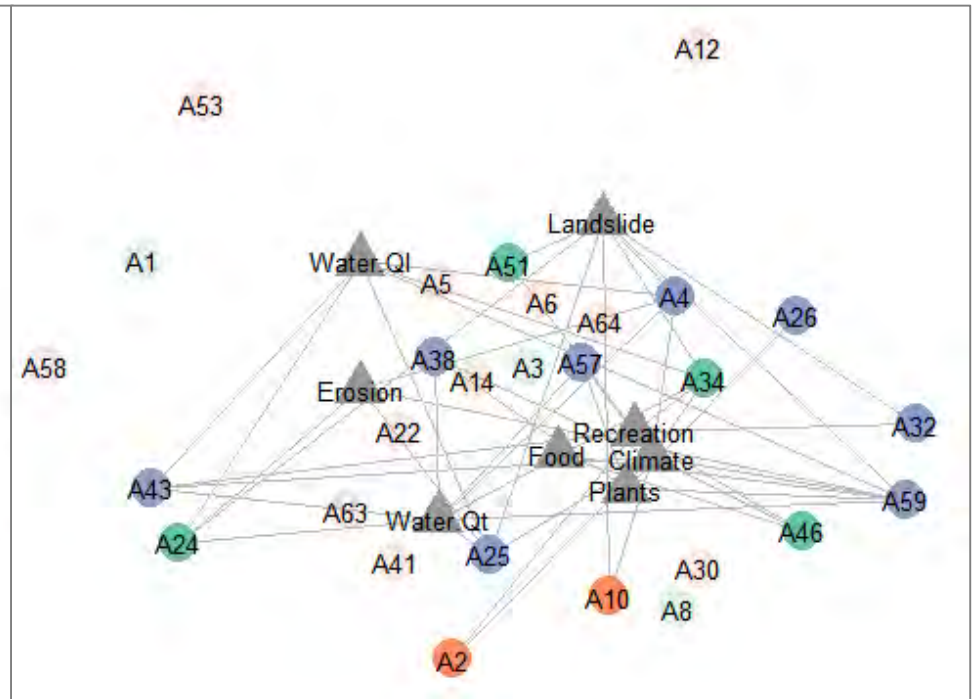


Stakeholders – Ecosystem Services networks

Management

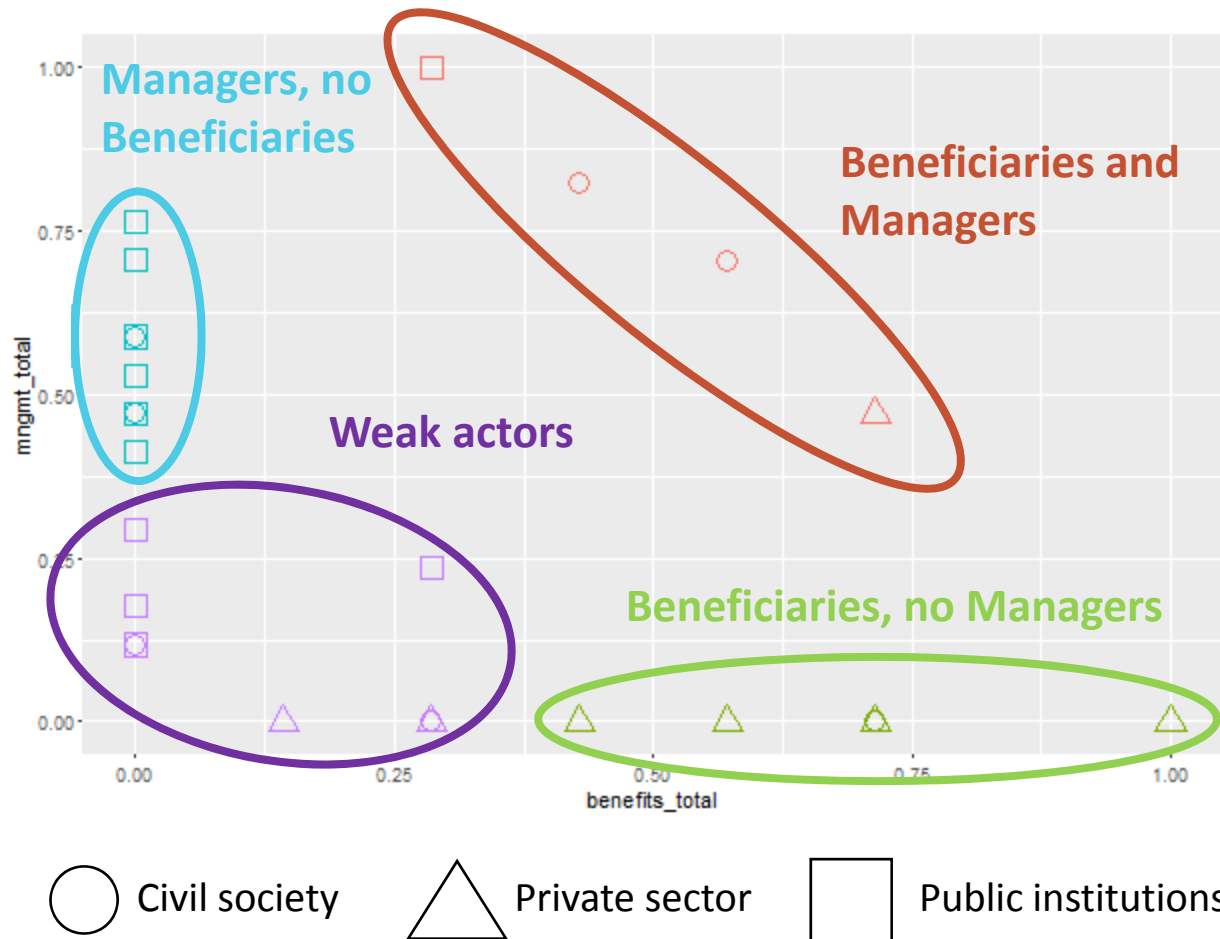


Benefits



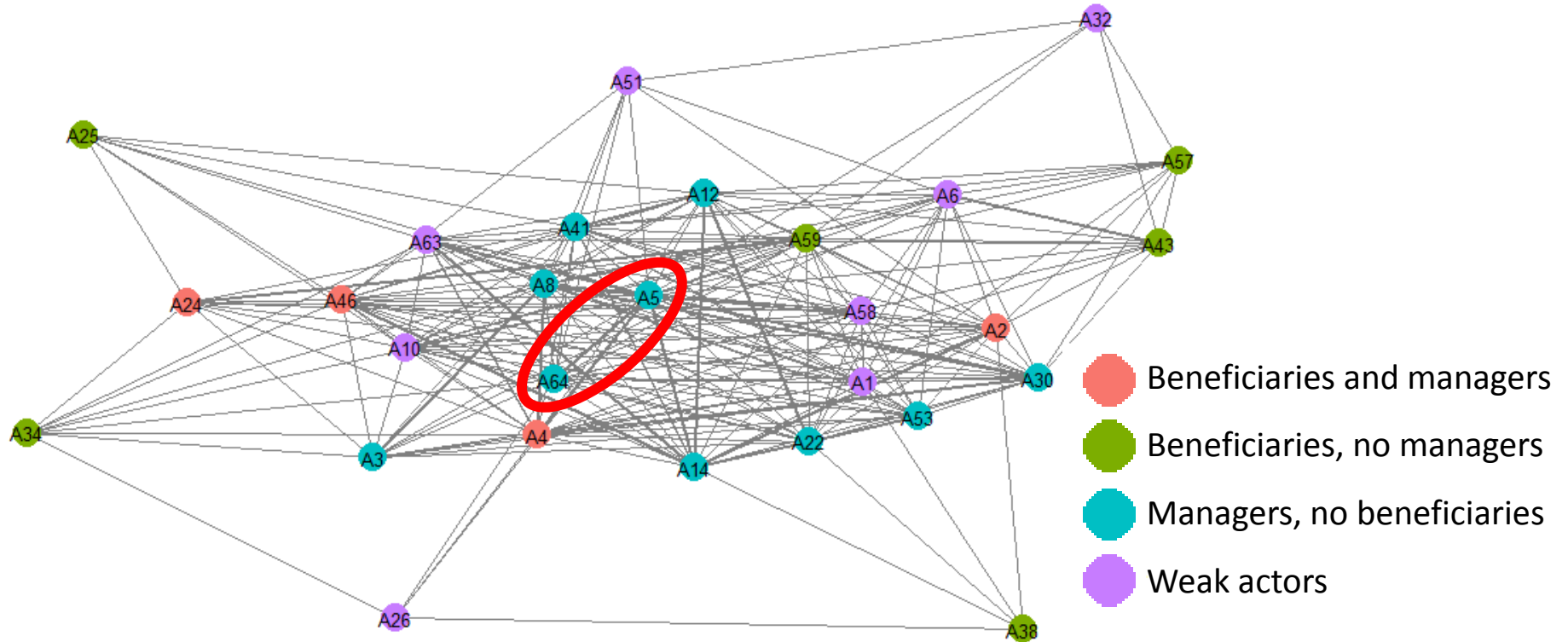
● Public institutions ● Private sector ● Civil society ▲ Ecosystem services

Hierarchical clustering of stakeholders



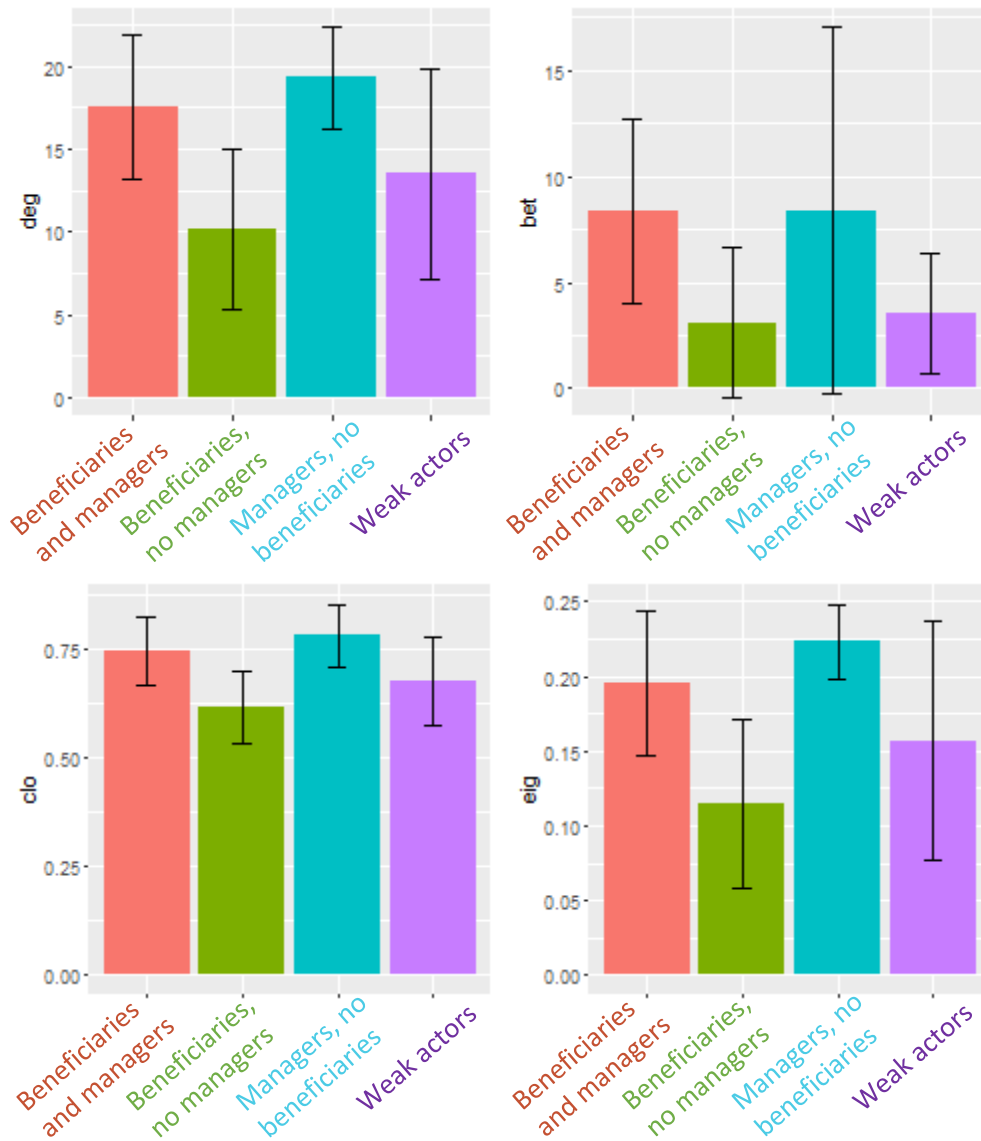
- Different types of stakeholders are found in the different clusters (Chi-Square Test, $p=0.013$)
- Beneficiaries are mostly from private sector or civil society
- Managers are mostly from public institutions or civil society

Beneficiaries are in periphery



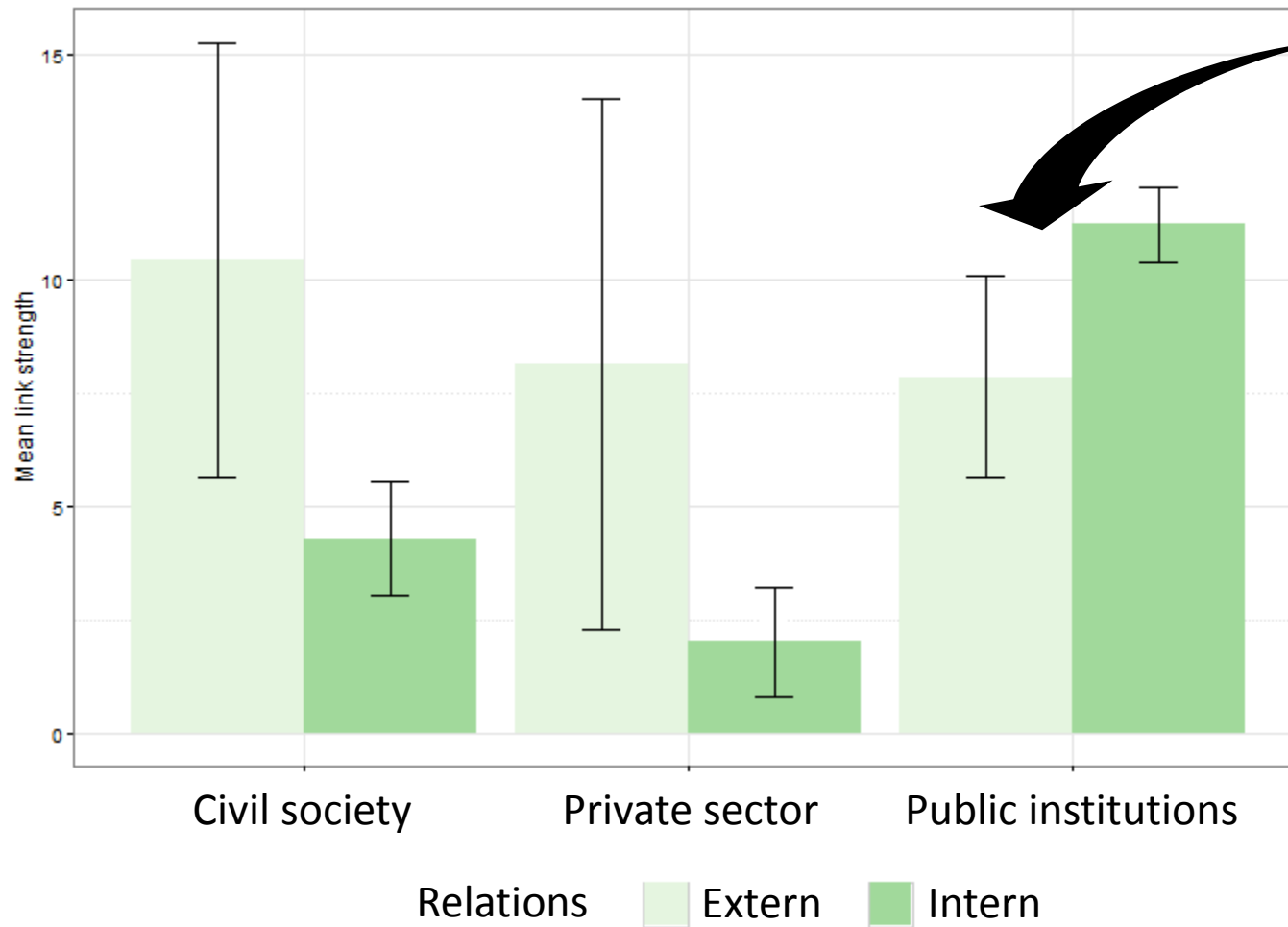
- Stakeholders have different roles in the core and periphery of the network (Chi-Square Test, p -value=0.0427)
- Managers are in the core of the network
- Municipalities are the two stakeholders (10%) with largest brokerage role

Beneficiaries are less connected



- All indicators of network connectivity show differences among stakeholders
 - Beneficiaries have lower connectivity
 - Most managers are well connected, but others are not

Interactions among groups of stakeholders



- Institutions interact mainly among themselves
- Private actors and civil society interact with other stakeholders



Conclusions

- Beneficiaries of ecosystem services are not managers (and vice versa)
- Power of managing ecosystem services is centralized among a few public institutions
 - Limit the representation of other stakeholders (equity issue)
 - Reduce the adaptive capacity of the system (adaptation issue)
- There is a gap between beneficiaries and managers of ecosystem services
 - Beneficiaries are less connected to other stakeholders
 - Institutions interact mostly between themselves
 - Generate mistrust in institutions that manage natural resources (legitimacy issue)
 - Create and enhance conflicts (social unrest issue)

Thanks for your attention!

If you have questions or comments on this presentation:
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