



Human Dimensions of Manuresheds

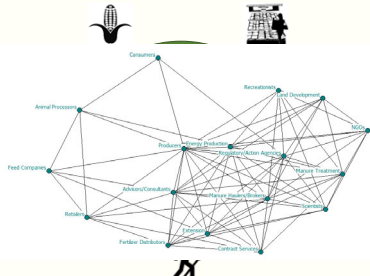


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Manureshed Actors


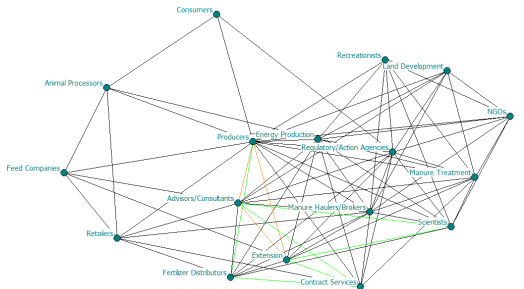


- Diversity of actors needed for successful nutrient cycling
 - Local (on-farm)
 - Local (off-farm)
 - Regional
 - National/Continental

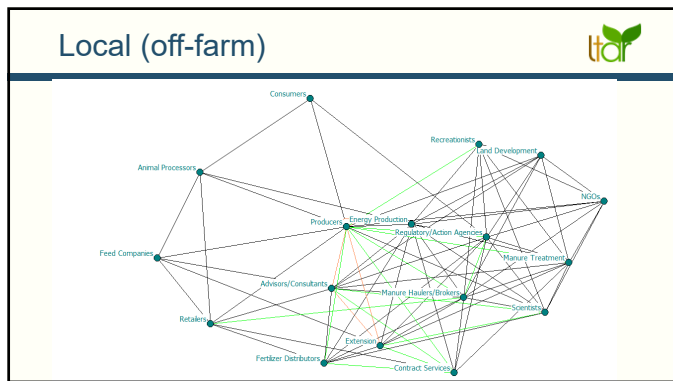


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Local (on-farm)

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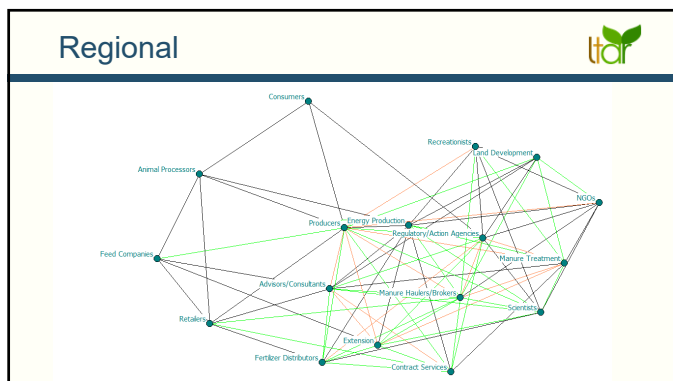


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Local-scale example

- Denmark Nitrate Vulnerable Zones
 - Collaboration between crop and livestock producers (Asai et al., 2014)
- Collaborative arrangement types
 - Business partnerships
 - Stable partnerships
 - Neighbor partners
 - Local network partners

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Regional-scale example

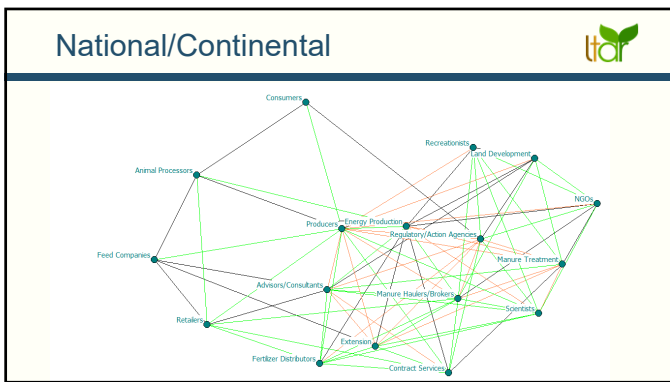
- Arkansas poultry litter export program
 - Illinois River and Eucha-Spavinaw watersheds
 - Litigation led to need for 33% of poultry litter to travel outside of watersheds
 - Brokering program established to connect poultry producers, haulers, and crop producers

Year	Produced (tons)	Used Locally (tons)	Exported (tons)	Exported as % of Produced
2007	800	500	300	37.5%
2008	800	200	600	75%
2009	1,200	800	400	33.3%
2010	1,400	800	600	42.9%
2011	1,400	800	600	42.9%

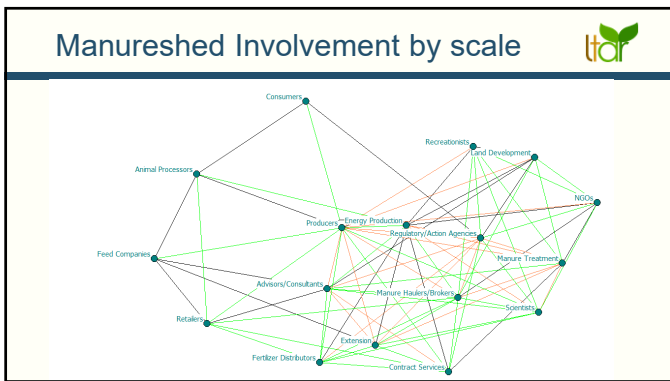
Average litter application rate decreased following court settlement.

Kleinman et al. 2015

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