Using IFRI data: Two examples

Frank van Laerhoven
Copernicus Institute of Sustainable development
Utrecht University
f.s.j.vanlaerhoven@uu.nl
nl.linkedin.com/pub/frank-van-laerhoven/5/833/189/

Why IFRI?

- Governing the Commons (Ostrom, 1990): Critique => the set up of the meta analysis reeks of cherry picking – i.e. conveniently lining up cases
- IFRI: large-N; longitudinal; protocolized data collection; random selection of cases (??); solid theoretical underpinnings; valid operationalization of dependent and independent variables; reliable data (training component)
- What are IFRI's overarching research questions?
- IFRI's core themes are biodiversity, livelihoods, institutions and forest carbon
- Explain variation; unravel causation…
- After all, in order to design interventions aiming at problem solving, one needs to have a solid understanding of what causes the problems to begin with…
- Balance between time-and-place particularities (i.e. context), and trends & patterns (i.e. generalizable outcomes with a structural impact)

The overarching **research questions** (at least, some of them)

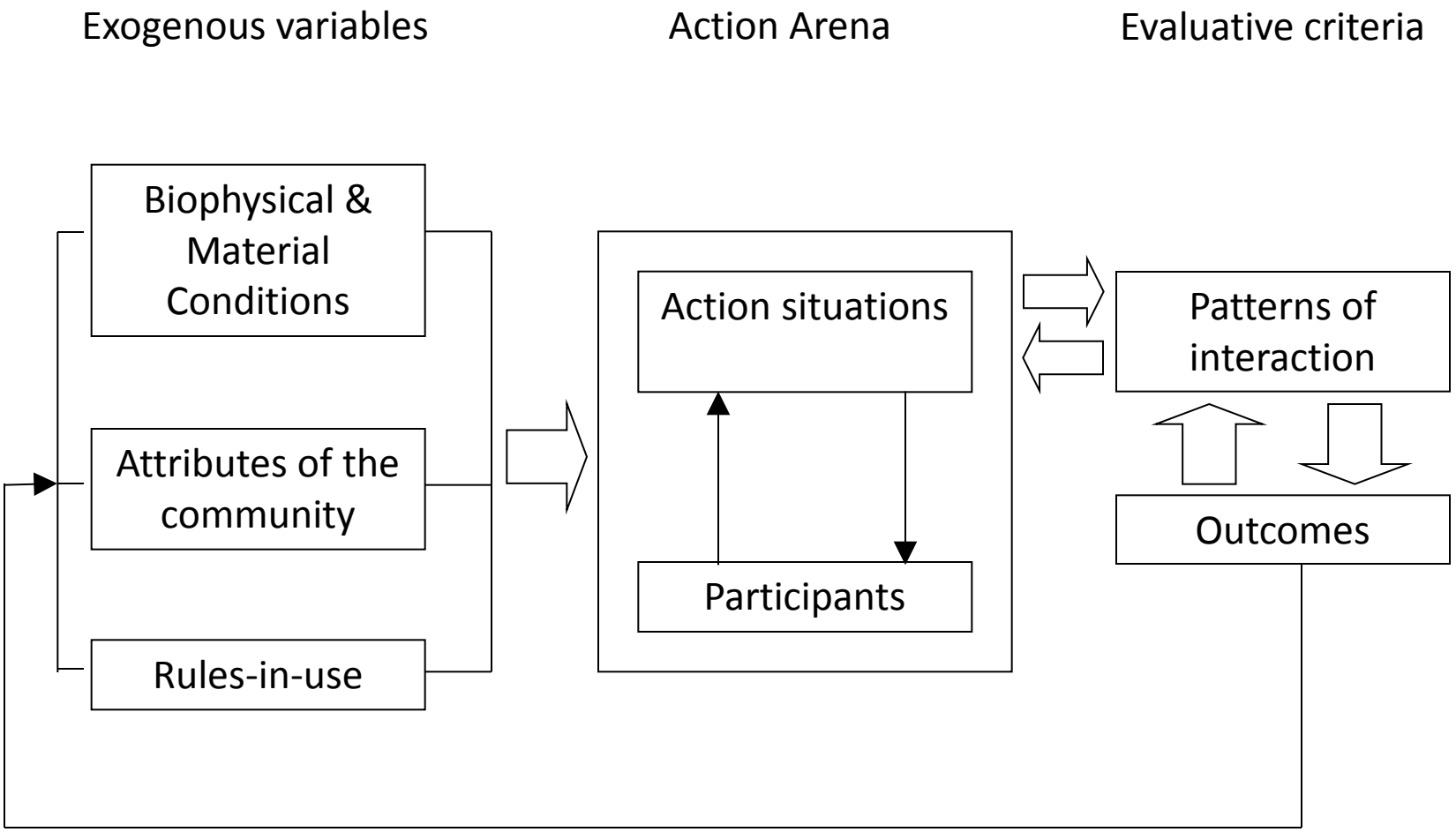
- The social/institutional side of the story?
- What accounts for variation in success of forest communities to fence off a *tragedy of the commons*?
- Why do some, and why don't others manage to solve appropriation and provision problems, when using a forest?
- Can we get our head around the fact why over-harvesting, and under-investment in a CPR context is a problem for some, while it is not for others?
- Why do some communities manage to solve collective action dilemmas whereas other do not?
- There is a LOT of theoretical and empirical stuff out there that served as the foundation under the whole IFRI endeavour

The **theory** underlying the data collection

TABLE 1 *Design principles for CPR institutions*

1	Clearly defined boundaries
2	Congruence between appropriation and provision rules and local conditions;
3	Participation of resource appropriators in decision-making;
4	Effective monitoring by monitors who are part of or accountable to the appropriators;
5	Graduated sanctions for resource appropriators who violate community rules;
6	Conflict resolution mechanism that are relatively cheap and easily accessible;
7	Minimal recognition of rights to organize for communities of resource appropriators
8	Organization in the form of multiple layers of nested enterprises

The **theory** underlying the data collection



The **theory** underlying the data collection

TABLE 2 *Critical enabling conditions for sustainability on the commons*
(Agrawal 2001)

	Clustering principles	Examples of variables
1	Characteristics of the resource system	Size, predictability of responses to interventions, and mobility of the resource units
2	Attributes of the user group	Group size, poverty rate, social capital, and leadership
3	Rules-in-use, or institutional arrangements	Complexity of the rules-in-use, ease of enforcement, and accountability mechanisms
4	External environment	Technology, market and state

Data collection:

Design & operationalization

settlement

Forest

Site

(Forest) governance

User groups

Non-harvesting organizations

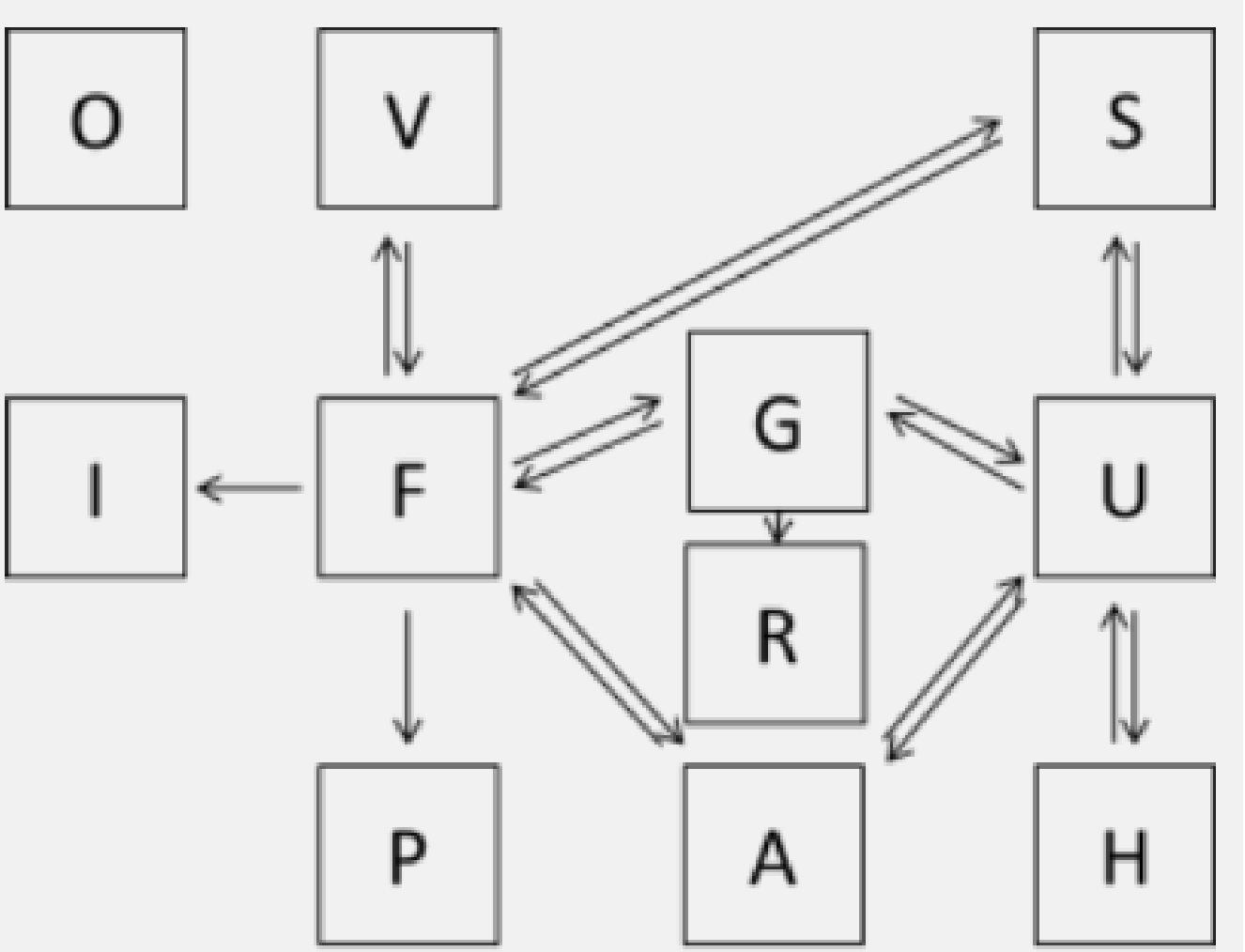
Forest associations

Settlement

Forest

Plot data

Forest products



Conceptual model for IFRI data collection

A: Forest Association form

F: Forest form

G: Group to Forest form

H: Household form

I: Inter-organization form

O: Site Overview form

P: Forest Plot form

R: Forest Products form

U: User Group form

V: Non-harvesting Organization form

Data collection methods

- 14 research centers in 12 countries
- Researchers solidly trained to guarantee (inter-coder) reliability (i.e. ‘the IFRI course’)
- Site visits:
  - Multi-disciplinary teams
  - 2-3 weeks
  - Conventional forest inventories
  - Social-economic and institutional data

How have I used IFRI data?

- Van Laerhoven, F. (2010). Governing community forests and the challenge of solving two-level collective action dilemmas—A large-N perspective. *Global Environmental Change*, *20*(3), 539-546.
- Van Laerhoven, F., & Andersson, K. P. (2013). The Virtue of Conflict: An Institutional Approach to the Study of Conflict in Community Forest Governance. *International Forestry Review*, *15*(1), 122-135.

Van Laerhoven, F. (2010)
Governing community forests

- **The research questions**
- Why is it so difficult to set up common property self-governance regimes?
- Why do some succeed, whereas others don't (or, to lesser extents)?

1. What sorts of collective action must forest users engage in in order to fence off resource collapse (i.e. ToCs)?
2. Under what conditions is it most likely that they actually will engage in these particular forms of collective action

Van Laerhoven, F. (2010) Governing community forests

- **The theoretical claims**
- *What does it take to maintain a forest in good condition?*
- Rules (provision and appropriation rules)
- Monitoring (i.e. rule enforcement)
- Maintenance
- *When will users make rules, monitor, and maintain?*
- A large number of candidate independent variables are suggested by the literatures
- Group size, homogeneity, social capital, leadership, forest conditions, salience, organization, autonomy, etc.

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- **Research design and hypotheses**
- **Step 1:** What sorts of collective action must forest users engage in in order to fence off resource collapse?
- **Dependendent variable = forest improvement dynamics**
- (i) Tree density, (ii) shrubs & bushes, (iii) ground cover, (iv) forest cover

Table 1
Descriptive statistics – step 1.

Variable	Description
Forest improvement dynamics	Have forests overall experienced a net improvement during the last 5 years? (yes = 1)
Rules	What percentage of potential product rules actually exist? (0–100%)
Monitoring	Do forest user groups engage in regular monitoring? (yes = 1)
Maintenance	How many forest maintenance tasks do forest user groups regularly engage in? (0–11 tasks)

Table 3
Results step 1 – explaining variation in forest improvement dynamics.

	B (SE)	95% CI for exp *b*		
		Lower	exp *b*	Upper
Constant	0.01 (0.29)		1.01	
Rules	−0.28 (0.61)	0.23	0.75	2.50
Maintenance	0.19* (0.07)	1.04	1.21	1.39
Monitoring	−1.50** (0.29)	0.13	0.22	0.38

R^2 = 0.14 (Hosmer and Lemeshow), 0.17 (Cox and Schnell), 0.23 (Nagelkerke).
Model χ^2 (3) = 57.51 ($p < 0.001$).
* $p < 0.01$.
** $p < 0.001$

Table 4
Results step 1 – changing probabilities for statistically significant coefficients.

	Probability of forests experiencing an overall improvement
Monitoring	
Min. ($x = 0$)	0.217
Max. ($x = 1$)	0.554
Maintenance	
Min. ($x = 0$)	0.364
Max. ($x = 7$)	0.684

ln(Odds) = 0.01 + (−0.28 × rules) + (0.19 × maintenance) + (−1.50 × monitoring).
$\text{Odds} = e^{0.01+(-0.28\times\text{rules})+(0.19\times\text{maintenance})+(-1.50\times\text{monitoring})}$.
Probability = Odds/(1 + Odds)

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- **Step 2:** Under what conditions is it most likely that forest user groups actually will engage in these particular forms of collective action?
- **Dependent variable:** Community engagement in regular monitoring

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Table 2
Descriptive statistics – step 2.

Variable	Description
Monitoring	Does the user group engage in monitoring?
Group size	Number of user group members (log)
Heterogeneity	Given the local definition of wealth, is there a great difference in wealth amongst households in the user group?
Social capital	How many cooperative activities other than forest governance do user group members engage in (0–6)?
Organization	Is the user group formally organized?
Leadership	Does the user group have a leader?
Forest size	Logged size (ha) of the forest(s) that a user group uses
Salience	Aggregate of percentages of user group needs met by forest for food, biomass, timber, and firewood
Competition	Does the user group face competition from other user groups that use the same forest?
Autonomy	Is the user group responsible for making rules about the forest?

Table 5
Results step 2 – explaining variation in engagement in monitoring.

	B (SE)	95% CI for exp b		
		Lower	exp b	Upper
Constant	1.12 (1.12)		3.05	
Group size	0.06 (0.10)	0.88	1.06	1.27
Heterogeneity	−0.69 (0.31)	0.27	0.50	0.93
Social capital	0.43* (0.12)	1.20	1.53	1.95
Organization	−1.42** (0.35)	0.12	0.24	0.48
Leadership	−0.96* (0.32)	0.21	0.38	0.71
Forest size	0.12 (0.10)	0.73	0.89	1.08
Salience	0.00 (0.00)	0.99	1.00	1.01
Competition	0.35 (0.40)	0.65	1.41	3.08
Autonomy	−0.96* (0.33)	0.20	0.38	0.74

R^2=0.35 (Hosmer and Lemeshow), 0.36 (Cox and Schnell), 0.50 (Nagelkerke).
Model χ^2 (9)=159.08 ($p < 0.001$).
* $p < 0.01$.
** $p < 0.001$.

Table 6
Results step 2 – changing probabilities for statistically significant coefficients.

	Probability of forest user groups engaging in regular monitoring
Social capital	
Min. ($x = 0$)	0.545
Max. ($x = 6$)	0.941
Organization	
Min. ($x = 0$)	0.410
Max. ($x = 1$)	0.742
Leadership	
Min. ($x = 0$)	0.464
Max. ($x = 1$)	0.693
Autonomy	
Min. ($x = 0$)	0.471
Max. ($x = 1$)	0.699

$\ln(\text{Odds}) = 1.12 + (0.06 \times \text{group size}) + (-0.69 \times \text{heterogeneity}) + (0.43 \times \text{social learning}) + (-1.42 \times \text{organization}) + (-0.96 \times \text{leadership}) + (0.12 \times \text{forest size}) + (0.00 \times \text{salience}) + (0.35 \times \text{competition}) + (-0.96 \times \text{autonomy})$.

$\text{Odds} = e^{\ln(\text{Odds})}$

$\text{Probability} = \text{Odds}/(1 + \text{Odds})$.

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- Additional result
- Having a high potential for collective action...
- ...i.e. Having high scores on autonomy, social capital, leadership, and organization..
- ..is more often translated into actual engagement in collective action, when groups do not face competition..
- ..i.e. When they are the only group using a forest

Van Laerhoven & Andersson (2013): The virtue of conflict

- **The research question**
- If conflict undermines collective action...
- ...and if collective action is indispensable for the sustainable governance of the commons...
- ...why is it that we observe examples of long-enduring CPR governance going hand-in-hand with reports of conflicts between its users?

Van Laerhoven & Andersson (2013): The virtue of conflict

- **The relevance**
- The potential of conflict is rampant in natural resource governance
- Irrigation: head- vs tail enders
- Agriculture: crop cultivation vs cattle ranching
- Ground water: residential use vs use for agriculture
- Watersheds: upstream-downsteam dynamics
- Fisheries: open-access character results in ToC
- General: the rich and the powerful vs marginalized segments

Van Laerhoven & Andersson (2013): The virtue of conflict

- **The conceptual model & the hypotheses**
- Collective action in the form of group engagement in monitoring activities increases the likelihood of good community forest governance arrangments
- The likelihood of groups engaging collective action - e.g. monitoring - increases when they score high on (i) autonomy, (ii) social capital), and (iii) organization

Van Laerhoven & Andersson (2013): The virtue of conflict

- **Theory on vicious side of conflict**
- Conflict resolution: third parties help to reframe positions and interests
- Conflicts are a messy hindrance that leads to dysfunctional systems
- **Theory on the virtuous side of conflict**
- Conflic transformation: constructive conflict can act as a catalyst for legitimate change
- **Institutional theory on conflict**
- Any environment in which boundedly rational individuals with heterogeneous preferences must decide on a coherent group preference is potentially conflictive
- Consensuses are inherently unstable, contestable and can be exected to be challenged

Van Laerhoven & Andersson (2013): The virtue of conflict

- **The conceptual model & the hypotheses**

1. If sustainable forest management and conflict mix as badly as claimed, one would expect a negative correlation between the two variables
2. One would also expect a negative correlation between conflict levels at the one hand, and the reported levels of engagement in monitoring activities, on the other
3. The claimed non-compatibility of conflict and good community forest governance should result in a negative correlation between conflict on the one hand , and (i) autonomy, (ii) social capital, and (iii) organization, and on the other.

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FIGURE 2 *Conceptual framework*

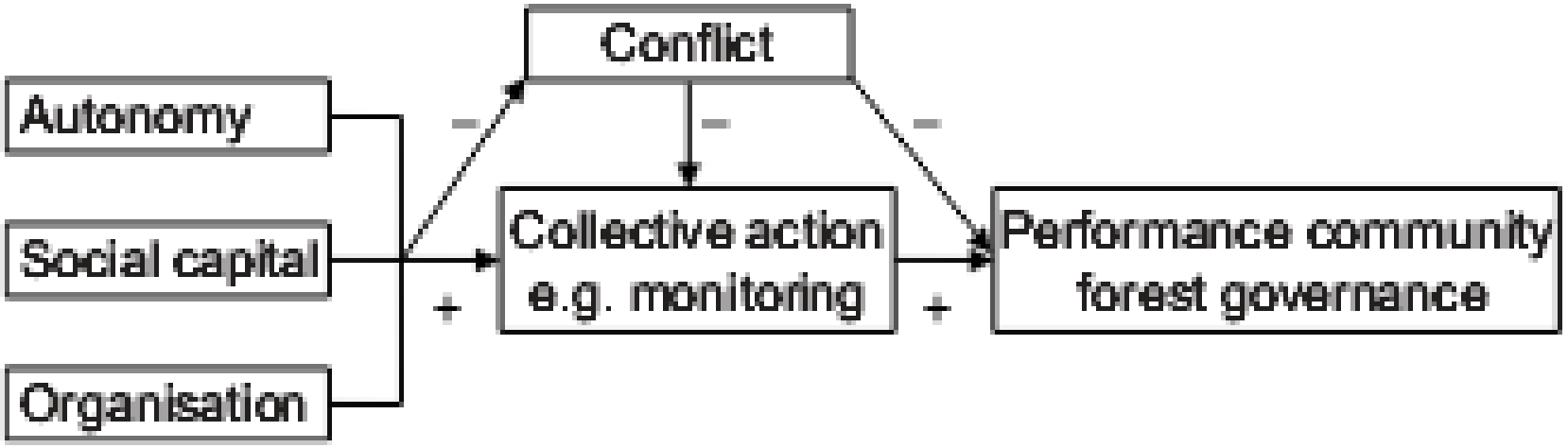

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TABLE 3 *Descriptive statistics of variables used in tests*

Variables	Description	N	Min	Max	Mean	Std. Dev.
Conflict	Has the group faced any issues engendering conflict, during the last two years? (yes=1)	470	0	1	0.30	0.458
Community forest governance performance	Is the vegetation density of the forest used by this user group sparse (x=0) or dense (x=1)?	478	0	1	0.65	0.477
Autonomy	Is the user group responsible for making rules about forest use? (yes=1)	478	0	1	0.38	0.486
Monitoring	Does the forest user group engage in monitoring activities? (yes=1)	499	0	1	0.50	0.500
Social capital	Does the user group engage in forms of collective action not related to forest governance? (yes=1)	486	0	1	0.62	0.487
Organisation	Is the user group formally organised? (yes=1)	492	0	1	0.39	0.488

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1. If sustainable forest management and conflict mix as badly as claimed, one would expect a negative correlation between the two variables
- User groups that are succesful at maintaining their forest, are 1.68 more likely to report conflict

TABLE 4 *Conflict and governance outcomes*

	no conflict	conflict
Relatively sparse vegetation	116	34
Relatively dense vegetation	189	93

χ^2 (1) = 6.23, p < 0.005

$\text{Odds}_{\text{conflict, successful CPR mgmt}} = 93/189 = 0.49$

$\text{Odds}_{\text{conflict, unsuccessful CPR mgmt}} = 34/116 = 0.29$

Odds ratio = 0.49/0.29 = 1.68

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2. One would also expect a negative correlation between conflict levels at the one hand, and the reported levels of engagement in monitoring activities, on the other

- User groups that engage in monitoring, are 2.19 times more like to report conflict

TABLE 5 *Conflict and monitoring*

	no conflict	conflict
No monitoring	177	48
Monitoring	150	89

χ^2 (1) = 14.09, $p < 0.001$

$\text{Odds}_{\text{conflict, monitoring}} = 89/150 = 0.59$

$\text{Odds}_{\text{conflict, no monitoring}} = 48/177 = 0.27$

Odds ratio = 0.59/0.27 = 2.19

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- The claimed non-compatibility of conflict and good community forest governance should result in a negative correlation between conflict on the one hand , and (i) autonomy, (ii) social capital, and (iii) organization, and on the other.
- Let's see..

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- Groups that have the recognized autonomy to govern their forest, are 2.33 time more likely to report conflict

TABLE 6 *Conflict and autonomy*

	no conflict	conflict
No autonomy	217	66
Autonomy	100	71

χ^2 (1) = 16.76, p < 0.001

$\text{Odds}_{\text{conflict, autonomy}} = 71/100 = 0.71$

$\text{Odds}_{\text{conflict, no autonomy}} = 66/217 = 0.30$

Odds ratio = 0.71/0.30 = 2.33

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- Groups that score high on indicators related with social capital, are 2.33 time more likely to report conflict

TABLE 7 *Conflict and social capital*

	no conflict	conflict
No social capital	136	32
Social capital	180	108

χ^2 (1) = 16.98, p < 0.001

$\text{Odds}_{\text{conflict, social capital}} = 108/180 = 0.60$

$\text{Odds}_{\text{conflict, no social capital}} = 32/136 = 0.24$

Odds ratio = 0.60/0.24 = 2.55

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- Groups that are formally organized, are 2.33 time more likely to report conflict

TABLE 8 *Conflict and organisation*

	no conflict	conflict
No organisation	207	66
Organisation	117	66

χ^2 (1) = 7.53, p < 0.005

Odds $_{\text{conflict, organisation}}$ = 66/117 = 0.56

Odds $_{\text{conflict, no organisation}}$ = 66/207 = 0.32

Odds ratio = 0.56/0.32 = 1.80

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- **Discussion**
- We observe that autonomous, well-organized groups that are endowed with high levels of social capital are both more likely to experience conflict and more likely to be successful at governing their CPR.
- Adds nuance to any policy or other intervention aimed at dealing with conflict
- Method: Non-experimental nature => statistical analysis fairly basic (chi2s)
- Selection bias: I'm not sure what the impact of conflict must have been in cases that failed (and that therefore weren't surveyed)

Final remarks

- Although IFRI data doesn't allow me to know what's going on in any given specific case..
- ..it does allow me to dismiss claims about the structural impact of certain variables that are claimed to matter for success
- ...it does allow me to identify variables with a structural impact
- This kind of understanding is helpful for policy design
- The precise nature of that impact in a particular context can be studied by means of smaller-n work that takes into account context specifics

Final remarks

- ***Comparison between places***
- Randomized case sample selection is questionable – bias towards successes => difficult to claim that the data allows for (quasi) experimental research design
- ***Comparison in time***
- Snap-shot nature => initially difficult to compare in time
- Now the growing number of re-visits is beginning to solve that problem
- ***Funding***
- Wider variety of cases is necessary (to solve the non-random selection issue)
- More longitudinality is preferable
- This requires money – CRCs cannot always find the required funding
- There is variation between CRCs in terms of success they are having in expanding their programs. This affects representativity of cases in the data set