Appendix 1

Table A1.1: Case # and village information

Case #	Habitation Name	# of Households	Resource Area	Resource Area per Household	Case #	Habitation Name	# of Households	Resource Area	Resource Area per Household
1	Ammagaripeta	165	7	0.04	26	Pothulavandlapalle	59	500	8.47
2	Bodyreddypalle	31	78	2.52	27	Bayareddypally	111	559	5.04
3	Oormadigapalle	15	40	2.67	28	Somarajukunta	215	800	3.72
4	Maramkindlapalle	60	96.1	1.60	29	Pedaballi Harijanawada	24	800	33.33
5	Malmotakapalle	20	92.25	4.61	30	Papannagaripalle	15	120	8.00
6	MKothuru	77	10	0.13	31	Nagamvaripalle	35	800	22.86
7	Holalli	153	240	1.57	32	Mundlavaripalle	100	98	0.98
8	Guddanpura	49	8	0.16	33	Dhaiyancheruvu	300	300	1.00
9	Donakonda	69	97.35	1.41	34	Jovukula	180	140	0.78
10	Sajjupalle	175	743.1	4.25	35	Kotireddygaripalle	25	40	1.60
11	Kundalkurki	426	274.56	0.64	36	Byrapalle	57	19.32	0.34
12	Vemgal	75	42.5	0.57	37	E Bairaganahalle	856	4	0.00
13	Thimmampalle	120	104	0.87	38	P Bairaganahalle	120	40	0.33
14	Yeddulavarikota	80	40	0.50	39	Srirampura	64	119.3	1.86
15	Penderivaripalle	50	25	0.50	40	Gudipalle	109	19.32	0.18

16	Kotakadapalle	110	60	0.55	41	Gorthapalle Colony	77	60	0.78
17	Nayanappagaripalle	60	64	1.07	42	Saragundlapalle	60	200	3.33
18	GuttakindapalleThanda	75	60	0.80	43	Nakkalahalle	102	234.32	2.30
19	Guddlavaripalle	20	40	2.00	44	P.Kothapalle	35	95.75	2.74
20	Bathanagaaripalle	85	40	0.47	45	M.Vyapalapalle	189	654.2	3.46
21	Chennappagaripalle	35	40	1.14	46	Vepulapalli	43	343.8	8.00
22	Kondappagarihalle	55	248	4.51	47	Dandevaripalli	134	78	0.58
23	Sunnappukunta Thanda	69	40	0.58	48	VK Halli	213	45	0.21
24	Singannavaripalle	52	950	18.27	49	Lakkenahalli	20	194	9.70
25	RamapuramThanda	29	40	1.38	50	Bathinigaripalli Tanda	67	967	14.43

Table A1.2. Success score: biophysical and social outcomes. Using biophysical and social outcomes, we calculated *success score* to assess overall success in self-governance. To calculate *success score*, we used a weighted average that considers the same degree of importance of biophysical and social outcomes (the full score of biophysical outcomes = 0.5; the full score of social outcomes = 0.5). Biophysical outcomes consist of two components (i.e., Resource and Physical Infrastructure). We assigned a score of 0.25 to each of the two biophysical components if it is indicated as "good" (=1); otherwise, a score of 0.00 was assigned to the component. Social outcomes consist of four components (i.e., Human Infrastructure, Trust, Rule Conformance, and Equity). We assigned a score of 0.125 to each of the four social components if it is indicated as "good" (=1); otherwise, a score of 0.00 was assigned to the component. The following formula represents these steps we took to calculate *success score*:

- $f(i) = 1,\ if\ i = "good";\ f(i) = 0,\ if\ i = "bad", where\ i = state\ of\ each\ outcome\ and\ i = "good"\ or\ "bad"$
- $Biophysical\ score = 0.25 \times \sum f(j),\ where\ j = state\ of\ Resource\ and\ Physical\ Infrastructure$
-

- $Social\ score = 0.125 \times \sum f(k),\ where\ k = state\ of\ Human\ infrastructure, Trust, Rule\ Conformance, and\ Equity$
- $Total\ score = Biophysical\ score + Social\ score$

Case ID	Biophysical Outcomes			Social Outcomes					SUCCESS SCORE
	Resource	Physical Infrastructure	**Biophysical Score**	Human Infrastructure	Trust	Rule Conformance	Equity	**Social Score**	
1	0	1	**0.25**	1	1	1	1	**0.50**	**0.75**
2	1	1	**0.50**	1	1	1	1	**0.50**	**1.00**
3	0	1	**0.25**	1	1	1	1	**0.50**	**0.75**
4	0	0	**0.00**	1	0	0	1	**0.25**	**0.25**
5	1	1	**0.50**	1	1	1	1	**0.50**	**1.00**
6	1	1	**0.50**	1	1	1	1	**0.50**	**1.00**
7	1	1	**0.50**	1	0	1	1	**0.375**	**0.875**
8	1	0	**0.25**	1	0	0	0	**0.125**	**0.375**
9	1	1	**0.50**	1	0	0	0	**0.125**	**0.625**
10	1	1	**0.50**	1	1	0	0	**0.25**	**0.75**
11	1	1	**0.50**	1	1	0	0	**0.25**	**0.75**
12	1	1	**0.50**	1	0	1	1	**0.375**	**0.875**
13	1	1	**0.50**	1	0	0	0	**0.125**	**0.625**
14	0	0	**0.00**	1	1	1	1	**0.50**	**0.50**

15	1	1	**0.50**	1	1	0	0	**0.25**	**0.75**
16	1	1	**0.50**	1	1	1	1	**0.50**	**1.00**
17	1	1	**0.50**	1	0	0	1	**0.25**	**0.75**
18	1	1	**0.50**	1	1	1	1	**0.50**	**1.00**
19	1	1	**0.50**	1	0	0	1	**0.25**	**0.75**
20	0	0	**0.00**	1	1	1	0	**0.375**	**0.375**
21	1	1	**0.50**	1	1	1	1	**0.50**	**1.00**
22	1	1	**0.50**	1	1	1	1	**0.50**	**1.00**
23	0	1	**0.25**	1	0	1	1	**0.375**	**0.625**
24	0	1	**0.25**	1	0	0	0	**0.125**	**0.375**
25	1	1	**0.50**	1	1	1	1	**0.50**	**1.00**
26	1	1	**0.50**	0	0	0	0	**0.00**	**0.50**
27	0	1	**0.25**	1	0	1	0	**0.25**	**0.50**
28	1	1	**0.50**	1	0	1	1	**0.375**	**0.875**
29	0	1	**0.25**	1	1	1	1	**0.50**	**0.75**
30	1	1	**0.50**	1	1	1	0	**0.375**	**0.875**
31	1	1	**0.50**	0	0	0	1	**0.125**	**0.625**
32	0	1	**0.25**	0	0	1	1	**0.25**	**0.50**

33	1	1	**0.50**	0	0	1	1	**0.25**	**0.75**
34	0	1	**0.25**	1	0	0	1	**0.25**	**0.50**
35	0	1	**0.25**	1	0	1	1	**0.375**	**0.625**
36	0	0	**0.00**	1	0	0	0	**0.125**	**0.125**
37	1	1	**0.50**	1	0	0	1	**0.25**	**0.75**
38	1	1	**0.50**	1	0	1	1	**0.375**	**0.875**
39	1	1	**0.50**	1	0	1	0	**0.25**	**0.75**
40	1	0	**0.25**	1	0	0	0	**0.125**	**0.375**
41	1	1	**0.50**	1	0	0	0	**0.125**	**0.625**
42	0	1	**0.25**	1	0	1	1	**0.375**	**0.625**
43	1	1	**0.50**	1	1	1	1	**0.50**	**1.00**
44	1	1	**0.50**	1	1	1	1	**0.50**	**1.00**
45	0	1	**0.25**	1	1	1	1	**0.50**	**0.75**
46	1	1	**0.50**	1	1	1	1	**0.50**	**1.00**
47	1	1	**0.50**	1	1	1	1	**0.50**	**1.00**
48	0	1	**0.25**	1	1	1	1	**0.50**	**0.75**
49	1	0	**0.25**	1	0	0	1	**0.25**	**0.50**
50	0	1	**0.25**	0	0	1	1	**0.25**	**0.50**

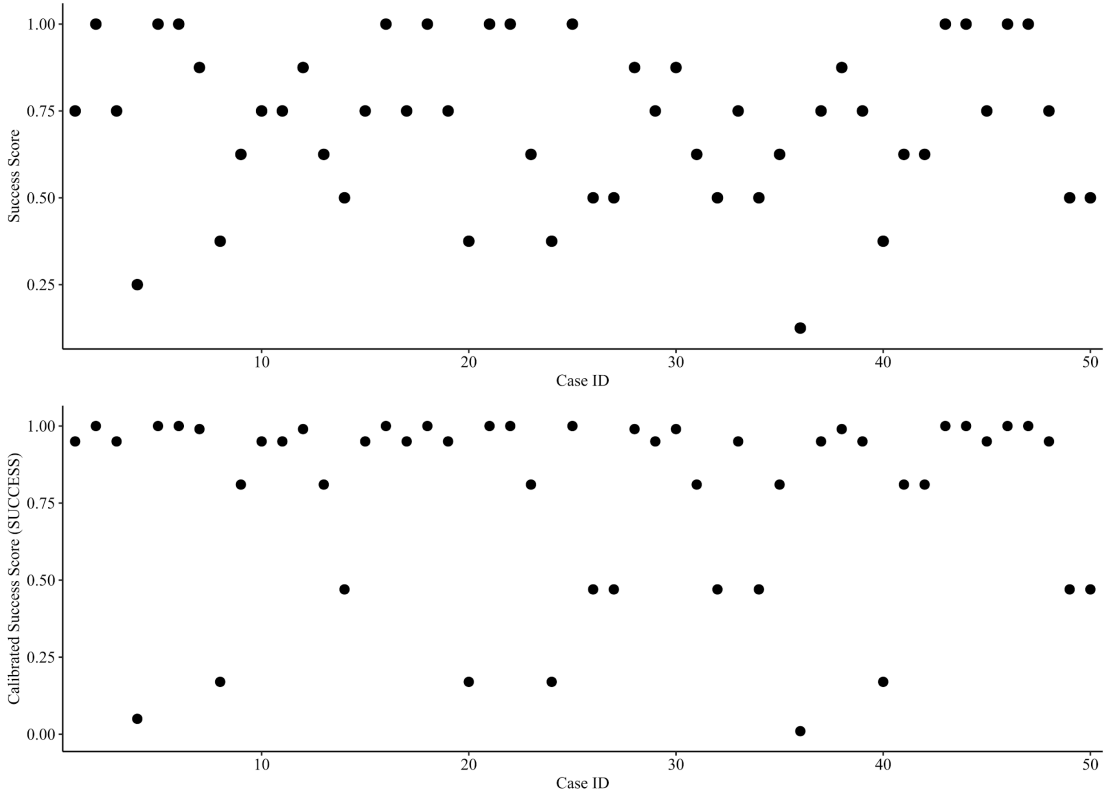

Fig. A1.1. Distribution of success score across villages (top) and distribution of the calibrated success score (SUCCESS) across villages (bottom). The variable *success score* was calibrated to indicate degree of membership in a set of successful self-governance. To do so, we used a calibration function which is embedded in the fsQCA 3.0 software and named "calibrate (x, n1, n2, n3)". For our study, x was replaced with the *success score* that we need to calibrate. We input 0.75 into n1, 0.51 into n2, and 0.25 into n3. The first value 0.75 is the threshold for full membership in the set of successful self-governance (high success; fuzzy score=0.95). The second value 0.51 represents the crossover point (medium success; fuzzy score=0.5). The last value 0.25 corresponds to the threshold for full non-membership in the set of successful self-governance (low success; fuzzy score=0). These three qualitative breakpoints were used to convert the success score into fuzzy membership scores, using transformations based on the log odds of full membership (Ragin and Davey, 2017)

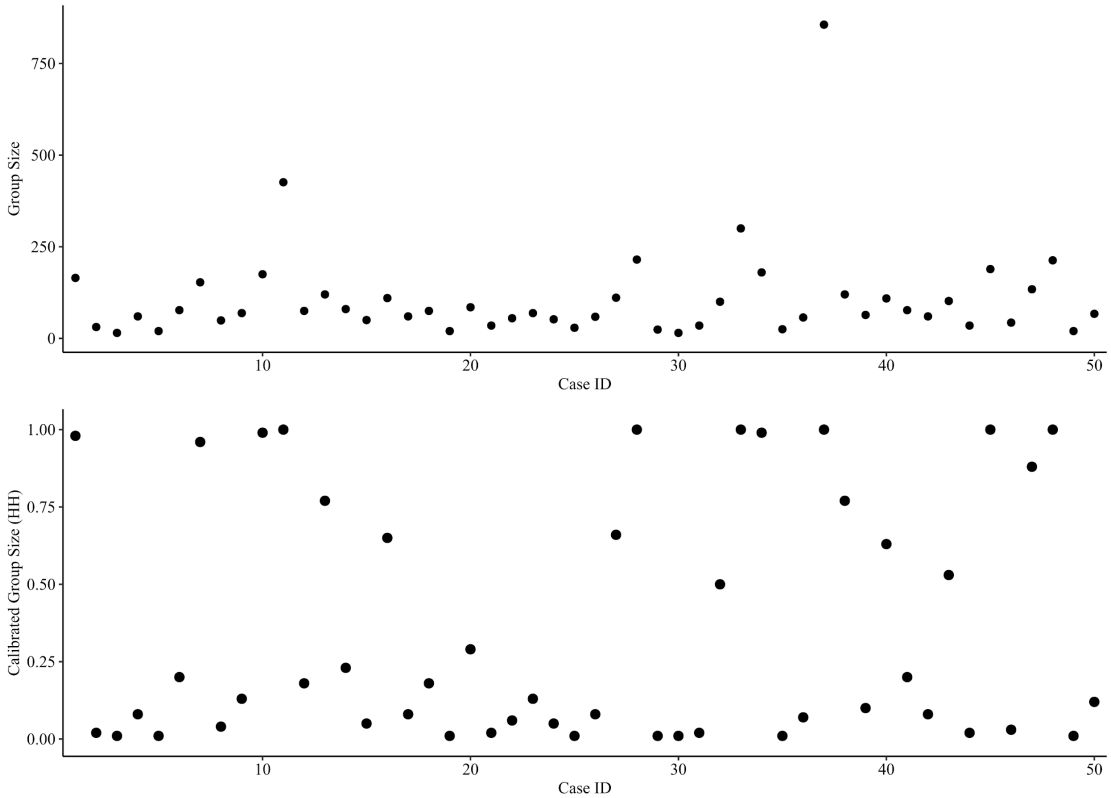

Fig. A1.2. Distribution of # of households across villages (top) and distribution of the calibrated # of households (HH) across villages (bottom). The contextual variable *group size* was calibrated to indicate degree of membership in a set of large group size. To do so, we used a calibration function which is embedded in the fsQCA 3.0 software and named "calibrate (x, n1, n2, n3)". For our study, x was replaced with *group size* that we need to calibrate. We input 150 into n1, 100 into n2, and 50 into n3. The first value 150 means the threshold for full membership in the set of large group size (fuzzy score=0.95). The second value 100 represents the crossover point (fuzzy score=0.5). The last value 50 corresponds to the threshold for full non-membership in the set of large group size (fuzzy score=0). These three qualitative breakpoints were used to convert the success score into fuzzy membership scores, using transformations based on the log odds of full membership (Ragin and Davey, 2017)

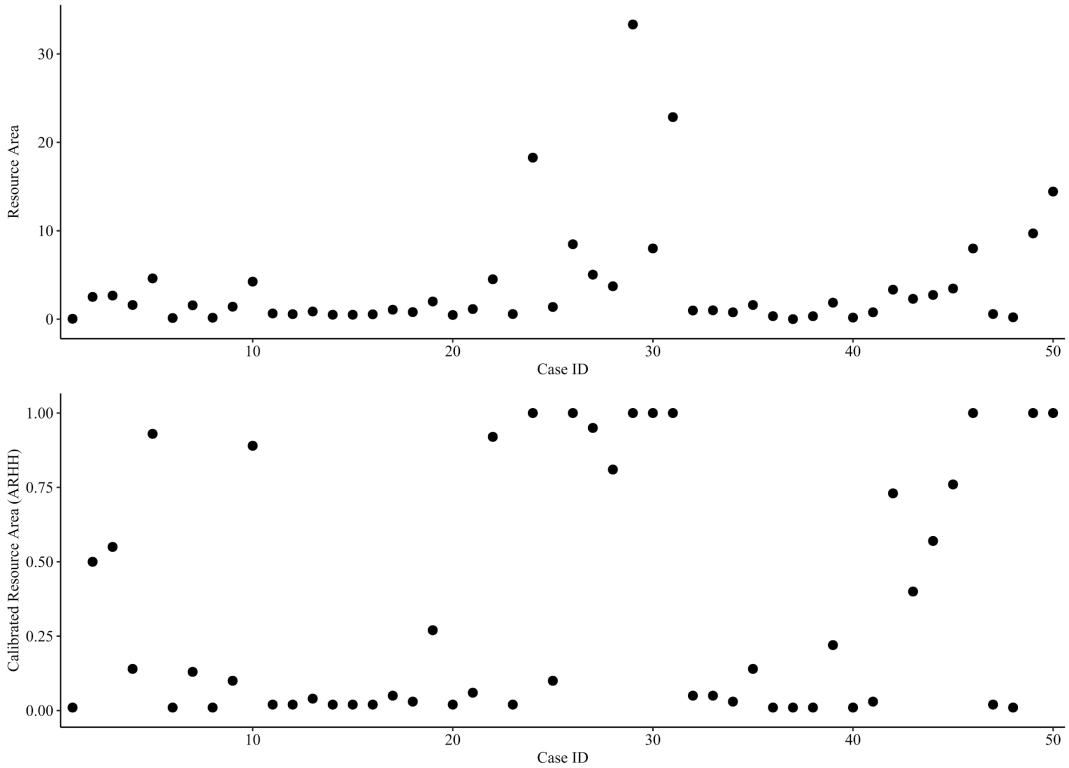

Fig. A1.3. Distribution of resource area across villages (top) and distribution of the calibrated resource area per household (ARHH) across villages (bottom). The contextual variable *resource area* was calibrated to indicate degree of membership in a set of large resource areas. To do so, we used a calibration function which is embedded in the fsQCA 3.0 software and named "calibrate (x, n1, n2, n3)". For our study, x was replaced with *resource area* that we need to calibrate. We input 5.0 into n1, 2.5 into n2, and 1.0 into n3. The first value 5.0 means the threshold for full membership in the set of large resource areas (fuzzy score=0.95). The second value 2.5 represents the cross-over point (fuzzy score=0.5). The last value 1.0 corresponds to the threshold for full non-membership in the set of large resource areas (fuzzy score=0). These three qualitative breakpoints were used to convert the success score into fuzzy membership scores, using transformations based on the log odds of full membership (Ragin and Davey, 2017)

Table A1.3. Fuzzy-set values of all conditions and the outcome. The institutional conditions (DPs) were dichotomously coded by assigning "1" to the presence and "0" to the absence. The fuzzy-set values of HH are the results of calibrating *# of households* (see Fig. A1.2. for details on how we calibrated it). The fuzzy-set values of ARHH are the results of calibrating *resource areas per household* (see Fig. A1.3. for details on how we calibrated it). The fuzzy-set values of SUCCESS are the results of calibrating *success score* (see Fig. A1.1 for details on how we calibrated it).

Case #	HH	ARHH	DP1A	DP1B	DP2A	DP2B	DP3	DP4A	DP4B	DP5	DP6	DP7	DP8	SUCCESS
1	0.98	0.01	1	1	0	0	0	0	0	0	1	1	0	0.95
2	0.02	0.50	1	1	1	1	1	1	0	0	1	1	1	1.00
3	0.01	0.55	0	0	1	1	0	0	0	0	1	0	1	0.95
4	0.08	0.14	1	0	1	1	0	0	0	0	1	1	1	0.05
5	0.01	0.93	1	1	1	1	1	1	1	1	1	1	1	1.00
6	0.20	0.01	1	1	0	0	1	1	1	0	1	1	1	1.00
7	0.96	0.13	1	0	1	0	0	0	0	0	1	1	1	0.99
8	0.04	0.01	1	0	0	0	0	0	0	0	1	1	1	0.17
9	0.13	0.10	1	1	1	1	1	1	0	0	1	1	1	0.81
10	0.99	0.89	1	1	1	1	1	1	0	1	1	1	1	0.95
11	1.00	0.02	1	0	0	0	0	0	0	0	0	0	1	0.95
12	0.18	0.02	1	1	1	1	1	1	0	1	1	1	1	0.99
13	0.77	0.04	1	1	1	1	1	1	0	1	1	1	1	0.81
14	0.23	0.02	1	1	1	1	1	1	0	1	1	1	1	0.47
15	0.05	0.02	1	1	1	1	1	1	0	1	1	0	1	0.95

16	0.65	0.02	1	1	1	1	1	1	0	1	1	0	1	1.00
17	0.08	0.05	1	1	1	1	1	1	0	1	1	1	1	0.95
18	0.18	0.03	1	1	1	1	1	1	1	1	1	1	1	1.00
19	0.01	0.27	1	1	1	1	1	1	0	1	1	1	1	0.95
20	0.29	0.02	1	1	1	1	1	1	0	1	1	1	1	0.17
21	0.02	0.06	1	1	1	1	1	1	0	1	1	1	1	1.00
22	0.06	0.92	1	0	1	0	0	0	0	0	1	1	1	1.00
23	0.13	0.02	1	1	1	0	0	0	0	0	0	1	1	0.81
24	0.05	1.00	1	0	1	1	0	0	0	0	1	1	0	0.17
25	0.01	0.10	1	0	0	0	1	0	0	0	1	1	1	1.00
26	0.08	1.00	1	0	1	1	1	0	0	0	1	1	1	0.47
27	0.66	0.95	1	1	1	1	1	1	0	1	1	1	1	0.47
28	1.00	0.81	1	1	1	1	0	1	0	1	1	0	1	0.99
29	0.01	1.00	0	0	0	0	0	0	0	0	0	1	0	0.95
30	0.01	1.00	1	1	0	0	1	0	0	0	0	1	0	0.99
31	0.02	1.00	1	1	1	1	1	1	0	1	1	0	1	0.81
32	0.50	0.05	1	1	1	1	1	1	0	0	1	1	1	0.47
33	1.00	0.05	1	1	1	1	1	1	0	1	1	1	1	0.95
34	0.99	0.03	1	0	0	0	1	1	0	1	1	0	1	0.47
35	0.01	0.14	1	1	1	1	1	1	0	1	1	1	1	0.81

36	0.07	0.01	1	0	1	1	1	1	0	0	1	0	1	0.01
37	1.00	0.01	1	1	1	1	1	1	0	0	0	0	1	0.95
38	0.77	0.01	1	1	1	1	1	0	0	0	1	0	1	0.99
39	0.10	0.22	1	0	1	1	0	0	0	0	1	1	1	0.95
40	0.63	0.01	1	0	1	1	1	0	0	0	1	1	1	0.17
41	0.20	0.03	1	1	1	1	1	1	0	1	1	1	1	0.81
42	0.08	0.73	1	1	1	1	1	1	0	0	1	1	1	0.81
43	0.53	0.40	1	1	1	1	1	1	0	1	1	1	1	1
44	0.02	0.57	1	1	0	1	1	0	0	1	1	1	0	1
45	1.00	0.76	1	1	1	1	1	1	0	1	1	1	0	0.95
46	0.03	1.00	0	1	0	1	1	1	0	1	1	1	1	1
47	0.88	0.02	1	1	0	1	1	0	0	0	1	1	0	1
48	1.00	0.01	1	1	0	0	1	1	0	1	1	1	0	0.95
49	0.01	1.00	0	0	0	0	0	0	0	0	1	1	1	0.47
50	0.12	1.00	1	1	0	0	1	0	0	1	1	1	0	0.47

Table A1.4. Truth Tables for the analysis of sufficiency for successful self-governance. This table was generated by the fsQCA 3.0 software (Ragin and Davey, 2016). The frequency threshold should be 1 or 2 when the total number of cases is relatively small (Ragin and Davey, 2017). The recommended value of the consistency threshold is between 0.8 and 0.9 based on QCA best practices (Basurto, 2013). The frequency threshold of 2 was chosen, and the consistency threshold of 0.8 was selected.

Model 1: SUCCESS = f (DP1A, DP1B, DP2A, DP2B, DP3, DP4A, DP5, DP6, DP7, DP8)

No contextual conditions	DP1A	DP1B	DP2A	DP2B	DP3	DP4A	DP5	DP6	DP7	DP8	SUCCESS	N (Case #)
	1	1	1	1	1	1	1	1	0	1	1	3 (15 16 31)
	1	1	1	1	1	1	1	1	1	1	1	15 (5 10 12 13 14 17 18 19 20 21 27 33 35 41 43)
	1	1	1	1	1	1	0	1	1	1	0	4 (2 9 32 42)
	1	0	1	1	0	0	0	1	1	1	0	2 (4 39)
	1	0	1	1	1	0	0	1	1	1	0	2 (26 40)

Model 2: SUCCESS = f (HH, DP1A, DP1B, DP2A, DP2B, DP3, DP4A, DP5, DP6, DP7, DP8)

HH	DP1A	DP1B	DP2A	DP2B	DP3	DP4A	DP5	DP6	DP7	DP8	SUCCESS	N (Case #)
0	1	1	1	1	1	1	0	1	1	1	1	3 (2 9 42)
0	1	1	1	1	1	1	1	1	0	1	1	2 (15 31)
1	1	1	1	1	1	1	1	1	1	1	1	5 (10 13 27 33 43)
0	1	1	1	1	1	1	1	1	1	1	1	10 (5 12 14 17 18 19 20 21 35 41)
0	1	0	1	1	0	0	0	1	1	1	0	2 (4 39)

Model 2: SUCCESS = f (ARHH, DP1A, DP1B, DP2A, DP2B, DP3, DP4A, DP5, DP6, DP7, DP8)

ARHH	DP1 A	DP1 B	DP2 A	DP2 B	DP 3	DP4 A	DP 5	DP6	DP7	DP8	SUCCE SS	N (Case #)
0	1	1	1	1	1	1	1	1	0	1	1	2 (15 16)
1	1	1	1	1	1	1	1	1	1	1	1	3 (5 10 27)
0	1	1	1	1	1	1	1	1	1	1	1	12 (12 13 14 17 18 19 20 21 33 35 41 43)
0	1	1	1	1	1	1	0	1	1	1	0	2 (9 32)
0	1	0	1	1	0	0	0	1	1	1	0	2 (4 39)

Table A1.5. Cases with greater than or equal to 0.75 membership in each solution term

Outcome: successful self-governance

	Combinations of conditions (Intermediate solution)	Cases with greater than or equal to 0.75 membership in a solution term
Model 1	(C1) DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP8	5 (1,1), 10 (1,0.95), 12 (1,0.99), 13 (1,0.81), 14 (1,0.47), 15 (1,0.95), 16 (1,1), 17 (1,0.95), 18 (1,1), 19 (1,0.95), 20 (1,0.17), 21 (1,1), 27 (1,0.47), 31 (1,0.81), 33 (1,0.95), 35 (1,0.81), 41 (1,0.81), 43 (1,1)
Model 2	(C2) **hh***DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP8 +	5(0.99,1), 19 (0.99,0.95), 35 (0.99,0.81), 21 (0.98,1), 31 (0.98,0.81), 15 (0.95,0.95), 17 (0.92,0.95), 12 (0.82,0.99), 18 (0.82,1), 41 (0.8,0.81), 14 (0.77,0.47), 20 (0.71,0.17)
	(C3) **hh***DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP6*DP7*DP8 +	5 (0.99,1), 19 (0.99,0.95), 35 (0.99,0.81), 2 (0.98,1), 21 (0.98,1), 17 (0.92,0.95), 42 (0.92,0.81), 9 (0.87,0.81), 12 (0.82,0.99), 18 (0.82,1), 41 (0.8,0.81), 14 (0.77,0.47), 20 (0.71,0.17)

	(C4) DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP7*DP8	5(1,1), 10 (1,0.95), 12 (1,0.99), 13 (1,0.81), 14 (1,0.47), 17 (1,0.95), 18 (1,1), 19 (1,0.95), 20 (1,0.17), 21 (1,1), 27 (1,0.47), 33 (1,0.95), 35 (1,0.81), 41 (1,0.81), 43 (1,1)
Model 3	(C5) **arhh***DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP8 + (C6) DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP7*DP8	12 (0.98,0.99), 14 (0.98,0.47), 15 (0.98,0.95), 16 (0.98,1), 20 (0.98,0.17), 18 (0.97,1), 41 (0.97,0.81), 13 (0.96,0.81), 17 (0.95,0.95), 33 (0.95,0.95), 21 (0.94,1), 35 (0.86,0.81), 19 (0.73,0.95), 43 (0.6,1) 5 (1,1), 10 (1,0.95), 12 (1,0.99), 13 (1,0.81), 14 (1,0.47), 17 (1,0.95), 18 (1,1), 19 (1,0.95), 20 (1,0.17), 21 (1,1), 27 (1,0.47), 33 (1,0.95), 35 (1,0.81), 41 (1,0.81), 43 (1,1)

- Acronyms: DP (presence of Design Principle); HH (large group size); ARHH (large resource area per household)
- Lowercase characters represent weak membership in the set of villages with large group size (hh) and with large resource area per household (arhh). Boldface letters emphasize two contextual conditions (group size and resource area).
- The symbol of "+" represents the logical operator OR and the "*" represents AND.

Model 1: Solution coverage = 0.387; Solution consistency = 0.838
Model 2: Solution coverage = 0.449; Solution consistency = 0.852
Model 3: Solution coverage = 0.366; Solution consistency = 0.841

Table A1.6. Sensitivity analysis
This table shows the simplified solution formula[†] under the assumption that each DP (Design Principle) contributes to successful self-governance *when present or absent*. The results are the same as those shown in Table 3 where we assumed that each DP contributes to successful self-governance *when present*.

Outcome: successful self-governance

	Combinations of conditions (Intermediate solution)	Consistency	Raw Coverage[††]
Model 1	(C1) DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP8	0.838	0.387
Model 2	(C2) **hh***DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP8 +	0.899	0.279
	(C3) **hh***DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP6*DP7*DP8 +	0.904	0.304
	(C4) DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP7*DP8	0.822	0.316
Model 3	(C5) **arhh***DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP8 +	0.869	0.291
	(C6) DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP7*DP8	0.822	0.316

- Acronyms: DP (presence of Design Principle); HH (large group size); ARHH (large resource area per household)
- Lowercase characters represent weak membership in the set of villages with large group size (hh) and with large resource area per household (arhh). Boldface letters emphasize two contextual conditions (group size and resource area).
- The symbol of "+" represents the logical operator OR and the "*" represents AND.

Model 1: Solution coverage = 0.387; Solution consistency = 0.838
Model 2: Solution coverage = 0.449; Solution consistency = 0.852
Model 3: Solution coverage = 0.366; Solution consistency = 0.841

[†]See Table A1.5 in Appendix 1 for cases with greater than 0.5 membership in each solution term
[††]Raw coverage measures the proportion of memberships in the outcome explained by each solution term. This measure is calculated by dividing the sum of consistent membership in the solution term by the sum of membership in the outcome (Ragin and Davey, 2016)

Table A1.7. Disaggregated model solutions

Outcome: resource outcome

	Combinations of conditions (Intermediate solution)†	Solution consistency	Solution coverage
Model 1	DP1A*DP2A*DP2B*DP3*~DP4A*DP6*DP7*DP8 + DP1A*~DP1B*DP2A*DP2B*DP3*DP6*DP7*DP8 + DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*~DP7*DP8	1	0.15
Model 2	**hh***DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*~DP7*DP8	1	0.07
Model 3	**arhh***DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*~DP7*DP8	1	0.06

Outcome: physical infrastructure outcome

	Combinations of conditions (Intermediate solution)†	Solution consistency	Solution coverage
Model 1	DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP8 + DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP6*DP7*DP8	0.91	0.47
Model 2	**hh***DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP +	0.90	0.43

	hh*DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP6*DP7*DP8 + DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP7*DP8		
Model 3	**arhh***DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP8 + **arhh***DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP6*DP7*DP8 + DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP7*DP8	0.90	0.41
Outcome: social outcome			
	Combinations of conditions (Intermediate solution)†		
Model 1	No combinations (or solution) were found††	N/A	N/A
Model 2	**arhh***DP1A*DP1B*DP2A*DP2B*DP3*DP4A*DP5*DP6*DP7*DP8	0.80	0.25
Model 3	No combinations (or solutions) were found††	N/A	N/A

- Acronyms: DP (presence of Design Principle); HH (large group size); ARHH (large resource area per household)
- Lowercase characters represent weak membership in the set of villages with large group size (hh) and with large resource area per household (arhh). Boldface letters emphasize two contextual conditions (group size and resource area).
- The symbol of "+" represents the logical operator OR and the "*" represents AND.

†To produce intermediate solutions, we assumed that HH (large group size) and ARHH (large resource area) could contribute to successful self-governance when it is present *or* absent, and that DPs could contribute to this outcome when they are present.

††The variable *social score* was calibrated to indicate degree of membership in a set of biophysical successful cases. To do so, we used a calibration function which is embedded in the fsQCA 3.0 software and named "calibrate (x, n1,

n2, n3)". For our study, x was replaced with the *social score* that we need to calibrate. We input 0.50 into n1, 0.25 into n2, and 0.00 into n3. The first value 0.50 is the threshold for full membership in the set of social success (high success; fuzzy score=0.95). The second value 0.25 represents the crossover point (medium success; fuzzy score=0.5). The last value 0.00 corresponds to the threshold for full non-membership in the set of social success (low success; fuzzy score=0.05). These three qualitative breakpoints were used to convert the success score into fuzzy membership scores, using transformations based on the log odds of full membership (Ragin and Davey, 2017). The frequency threshold in QCA models must be 1 or 2 when the total number of cases is relatively small (Ragin and Davey, 2017). The recommended value of the consistency threshold is between 0.8 and 0.9 based on QCA best practices (Basurto, 2013). For running our models, we set the frequency threshold to 2 and the consistency threshold at 0.8. No combinations or solutions were found by fsQCA for this parameter setting for social outcomes. The fsQCA software shows the following error message; "Error (Quine-McCluskey algorithm): The 1 Matrix is Empty." This means that no "success" (coded as 1) cases are found in our sample when the frequency threshold (i.e., threshold # of cases) is 2.

References

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