La Niña y los niños: Effects of an unexpected winter on early life human capital and family responses

Rafael J. Santos

5 Congreso de Economía Colombiana, 29 de septiembre de 2016

Outline

1. Motivation
2. Empirical Strategy
3. Data
4. La Niña
5. Descriptive Statistics and Internal validity
6. Los Niños
7. Households
8. Invesment responses
9. Conclusions

1 Motivation

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Investments in human capital before age 5

- Investments in human capital in early life are crucial for future well being (Garces et al (2002), Behrman and Rosenzweig (2004), Walker et al (2006), Barnett and Masse (2007), Hoddinott et al (2008), Heckman et al (2010), Gertler et al (2014), Attanasio et al (2014, 2015)).

Open questions

- Are there critical periods in the formation of human capital before age 5? (Almond and Currie (2011a)).
- Do families reinforce or compensate insults to early human capital? (Almond and Mazumder (2013)).
- What are the short-term effects of early life shock on mental/ socioemotional health? (Adhvaryu et al (2014)).

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This paper

- Tackles the previous questions with rich data.

This paper

- We identify critical periods of exposure for different human capital dimensions: health, cognitive and socioemotional.
- We explore wheter parental investment responses compensate or mitigate the shocks.
- We use panel data to investigate how parental characteristics just before the shocks mitigate the effects of these shocks.

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This paper

- To do this we use rainfall shocks during the Colombian winter of 2010-2011 as a source of variation in the inputs of human capital formation.
- Very rich data: geocoded daily rainfall data, geocoded residence of families, exact day of birth of the kids, multidimensional human capital measures, predetermined household characteristics, family investments,etc.

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Intuition

The backbone of our identification strategy consists in comparing kids of the same ages and regions who were affected by la Niña at different intensities in different periods of their life.

Basic regression

We observe a cross-section of kids after the Niña shocks and the characteristics of their households before and after the shocks. For child i of age t in household h living in m we estimate the following regression,

$$\theta_{ithm} = \sum_{\tau \in T} \beta_\tau exposure_\tau(t,h) + dmonth + d_t + d_m + \gamma' \theta_h + \varepsilon_{ith} \quad (1)$$

- θ_{ithm} is a human capital outcome variable.
- $exposure_\tau(t,h)$ is a measure of exposure of the kid to La Niña during period $\tau \in T$ where T is the set of periods under consideration. $T = \{InUtero, Year1, Year2, Year3, Year4\}$
- $dmonth$: month of birth dummies. d_t: dummies for the age of the kid in months. d_m: municipality fixed effects. θ_h are household level variables that are observed before the shock and, therefore, are not a function of the shock.
- ε_{ith} are standard errors clustered at the municipality level.

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ELCA 2013

- ELCA 2013 to measure outcome variables (birth-weight, low birth-weight, standardized weight for age, standardized height for age, cognitive tests TVIP, socio-emotional tests ASQ).
- Parental investment: Weighed at birth, vaccines, attends pre-school, time investments (teach, read, play), material investments (food consumption).
- Note: ELCA includes population under the 67% percentile of wealth.

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ELCA 2010

- Predetermined controls I: the total number of persons in the household, the number of male adults, the number of female adults, male children under age 15 and female children under age 15; we also include the age of the head and the age of the head squared. Average distance to the closest rainfall station and average distance squared.
- Predetermined controls II: A dummy if the head has at least completed secondary education, a measure of social capital which takes the value of one if the head of the household participates in local organizations, a crude proxy of credit access which takes the value of one if the household had debts in 2010 and a dummy which takes the value of one if the household is over the poverty line.

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ELCA Panel

- The change in households per capita consumption expenditures.

IDEAM

- Daily rainfall data is taken from The Institute of Hydrology.
- A day is a "shock-day" if rainfall is one standard deviation above its historical mean.
- Objetive data free of recall bias, reference dependence and adaptation: Exposure is relative to the environment (Guiteras, Jina and Mobarak (2015))

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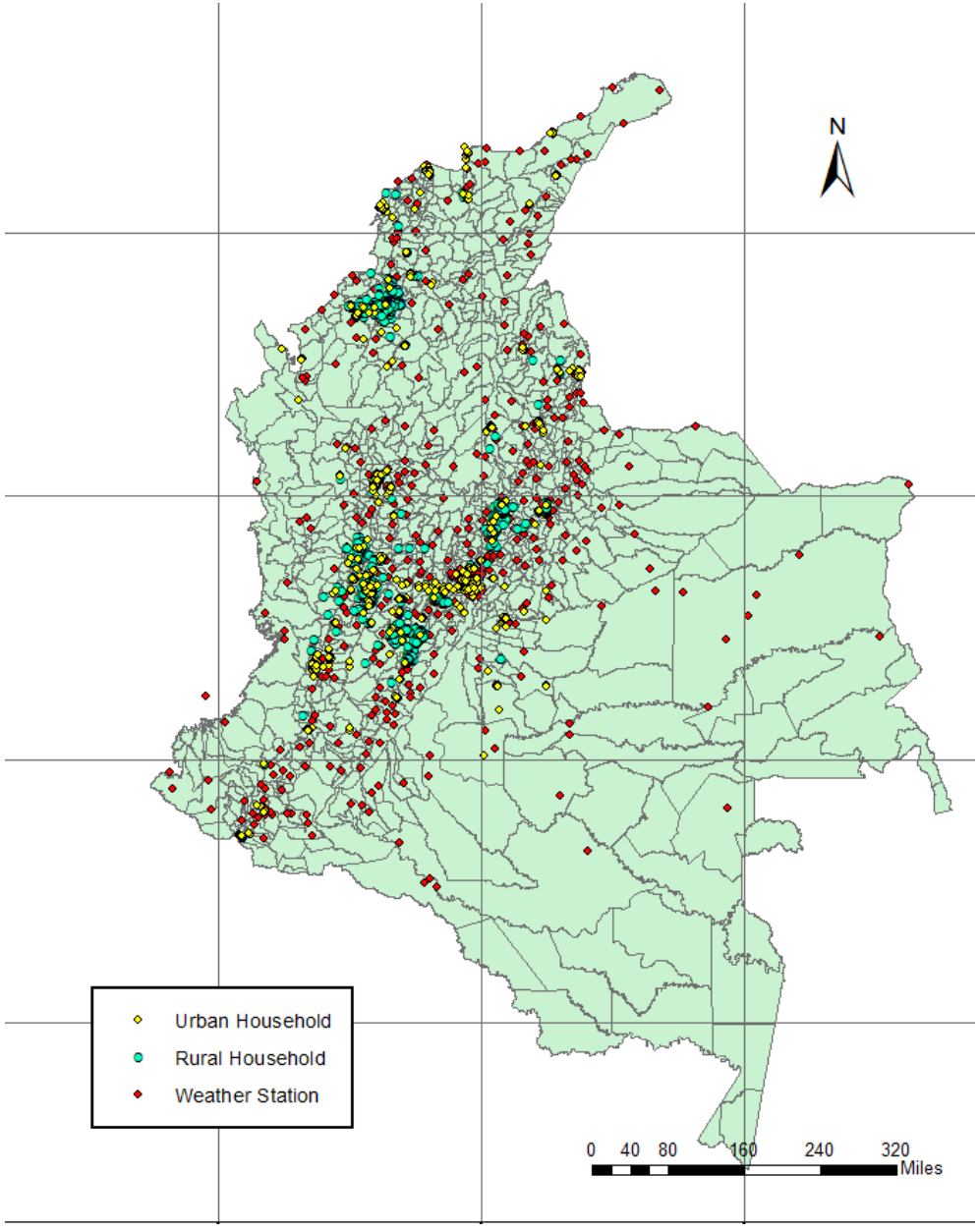
IDEAM + ELCA


N
Urban Household
Rural Household
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0 40 80 160 240 320
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La Niña + IDEAM

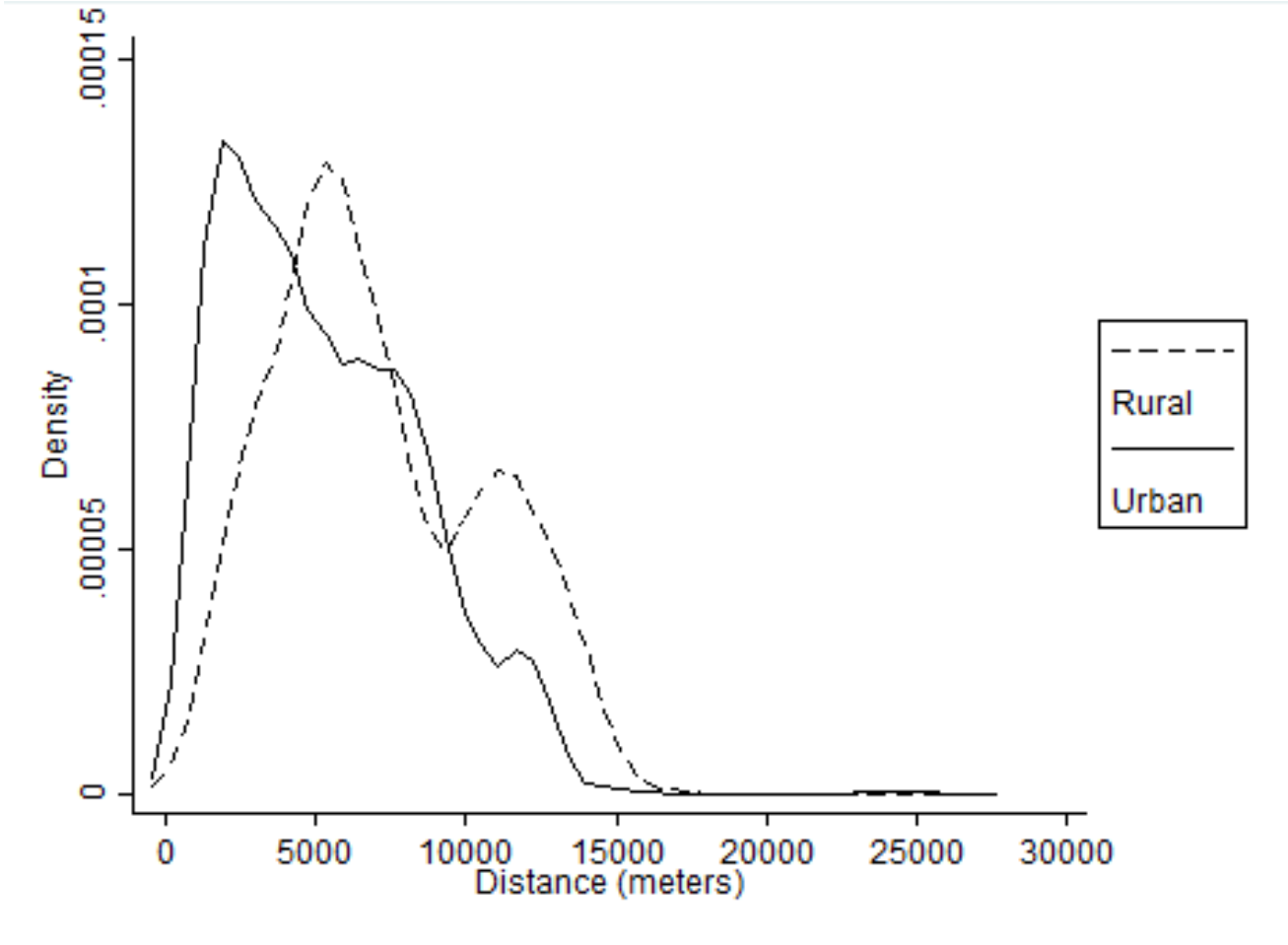

Figure: Distance to Weather Stations

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A double trident

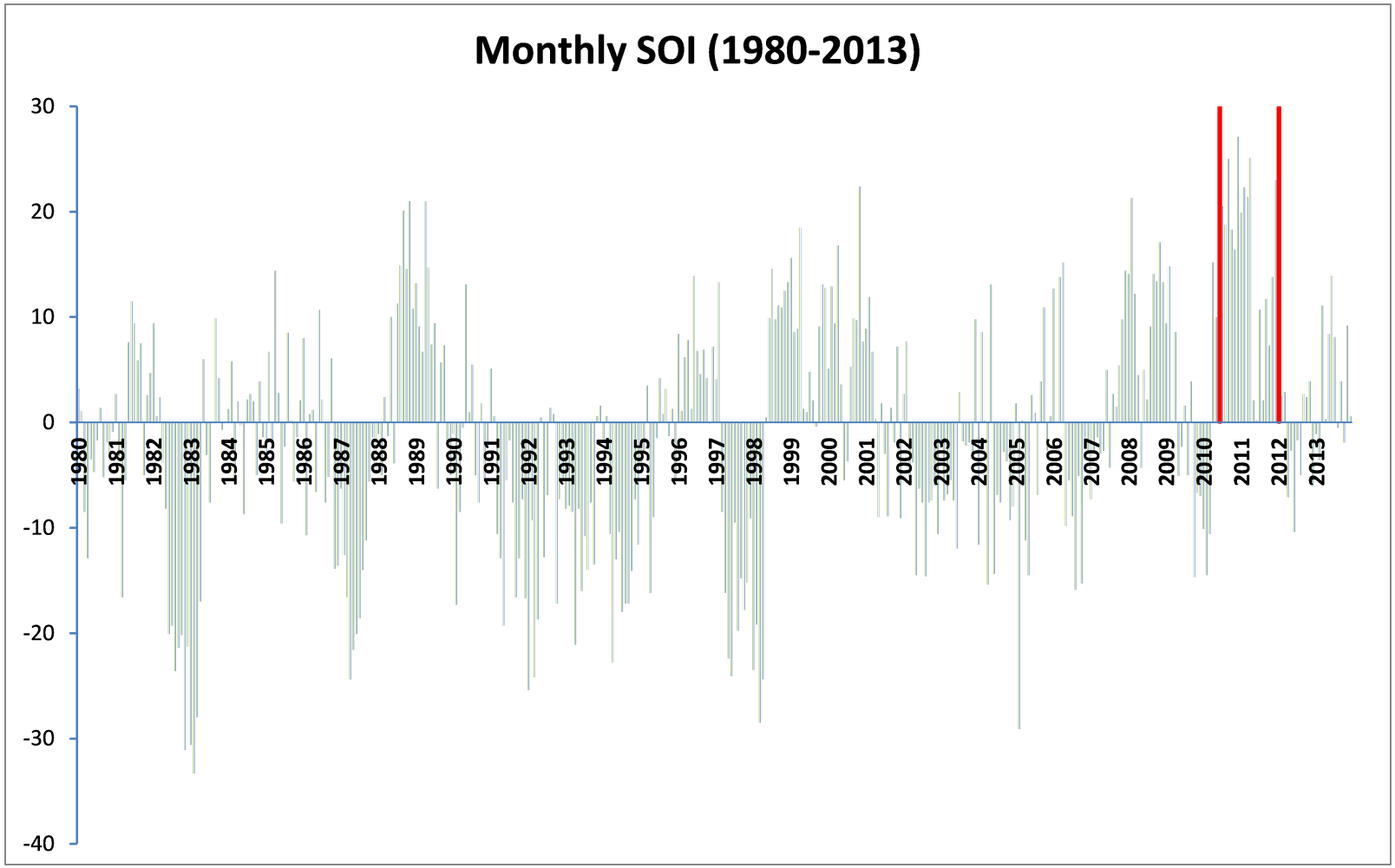
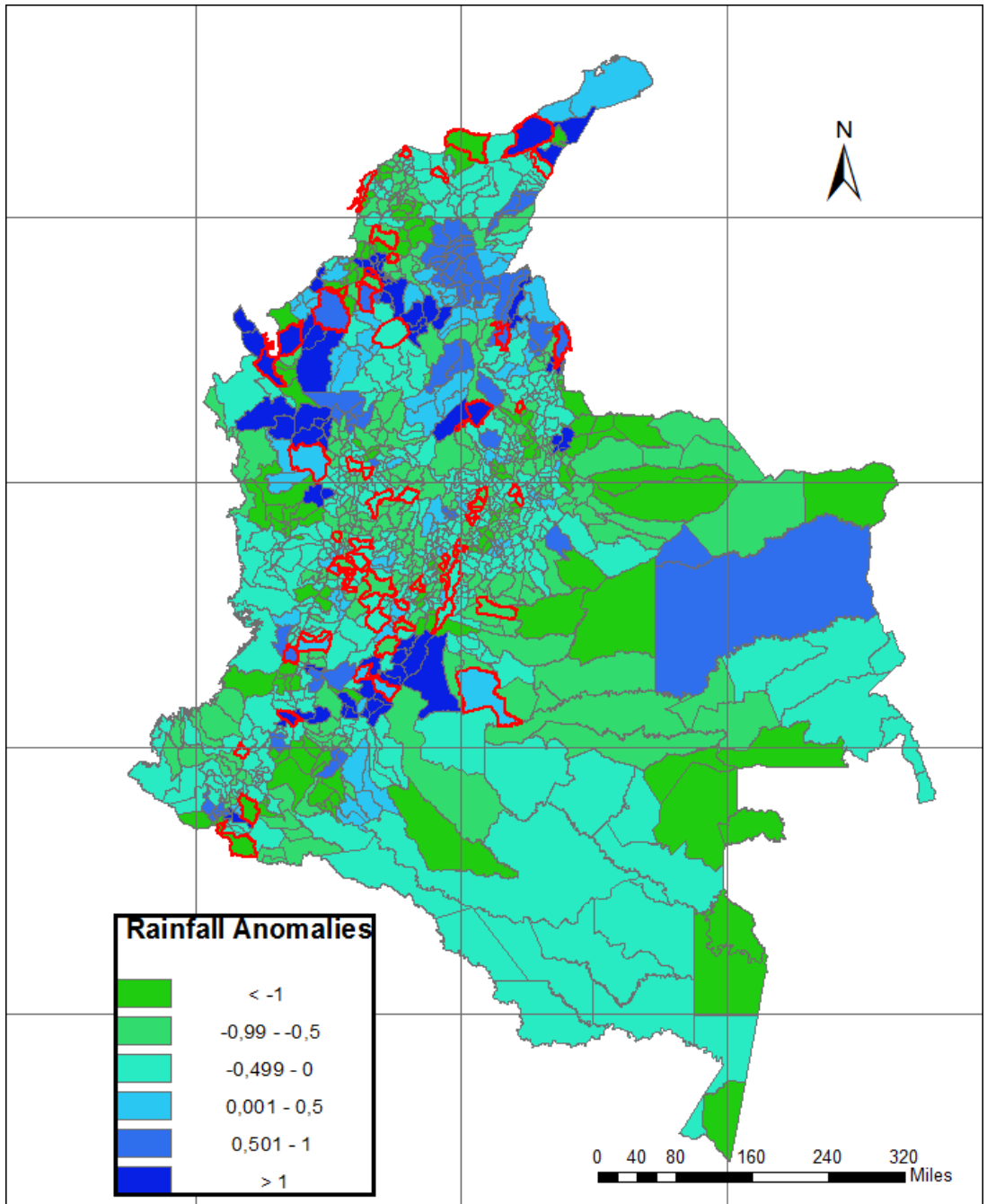


Figure: Southern Oscillation Index

Months with SOI>20:July and December (2010); February, March, April and December (2011)

July 2009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Rainfall Anomalies
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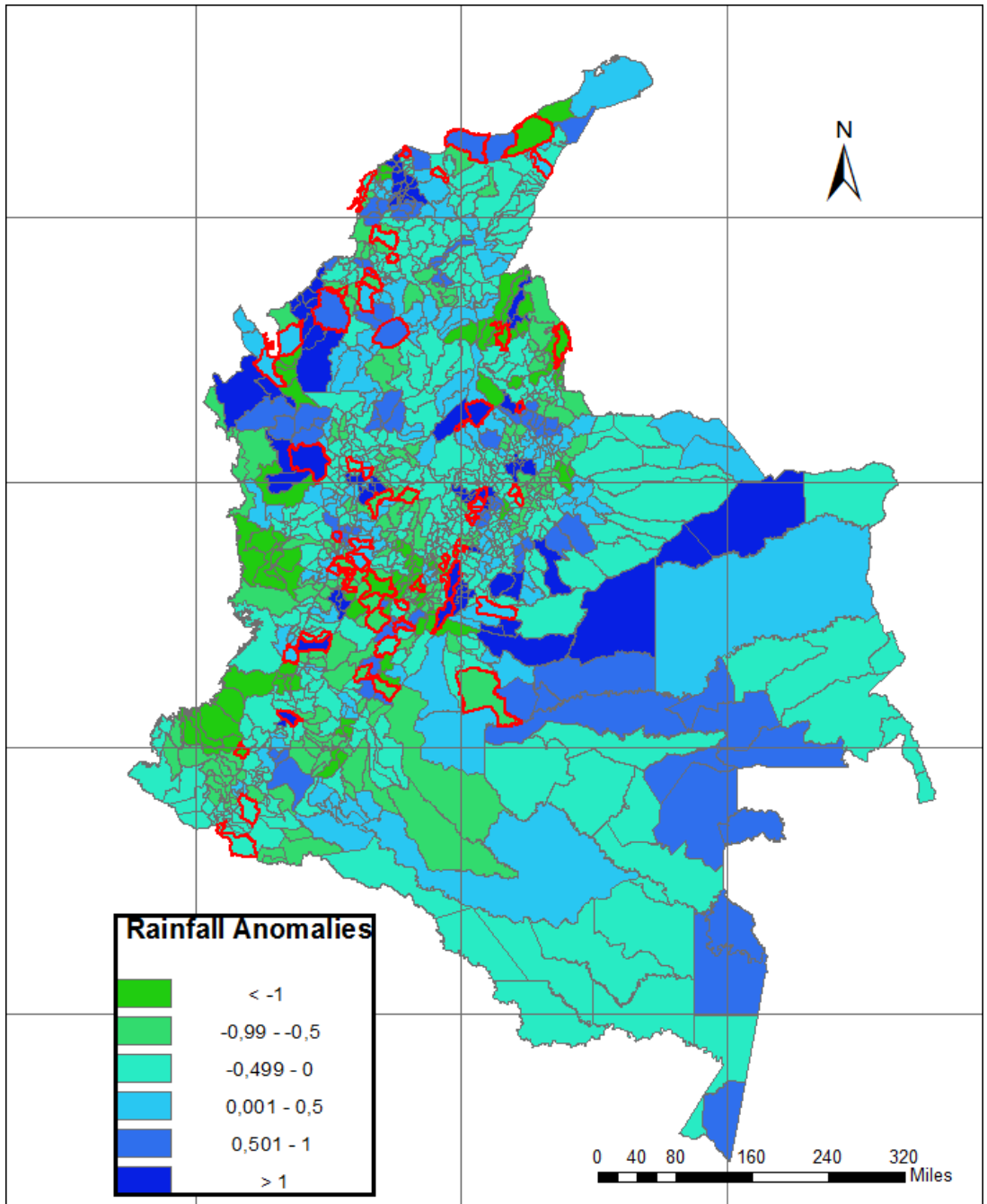
Miles

August 2009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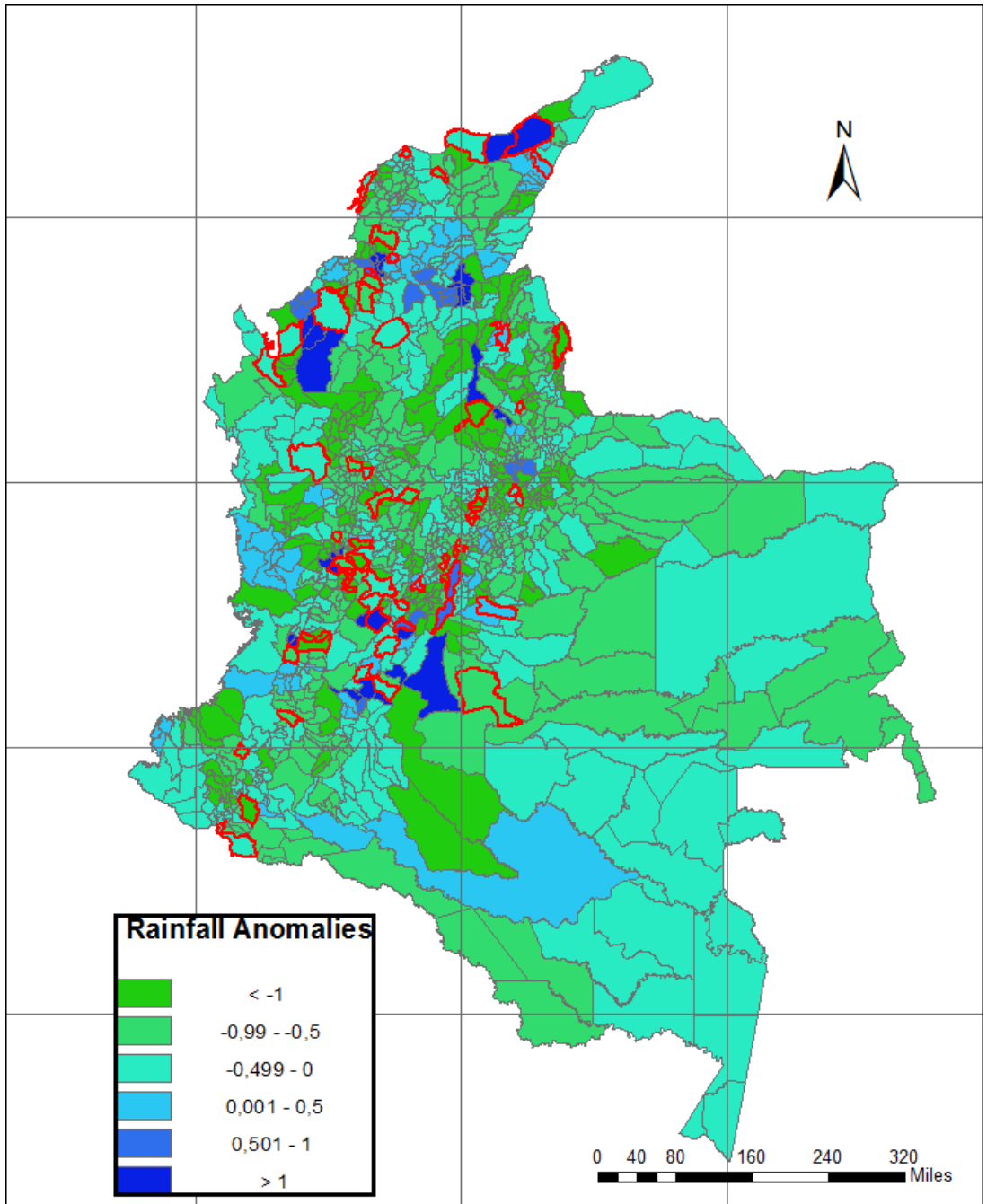
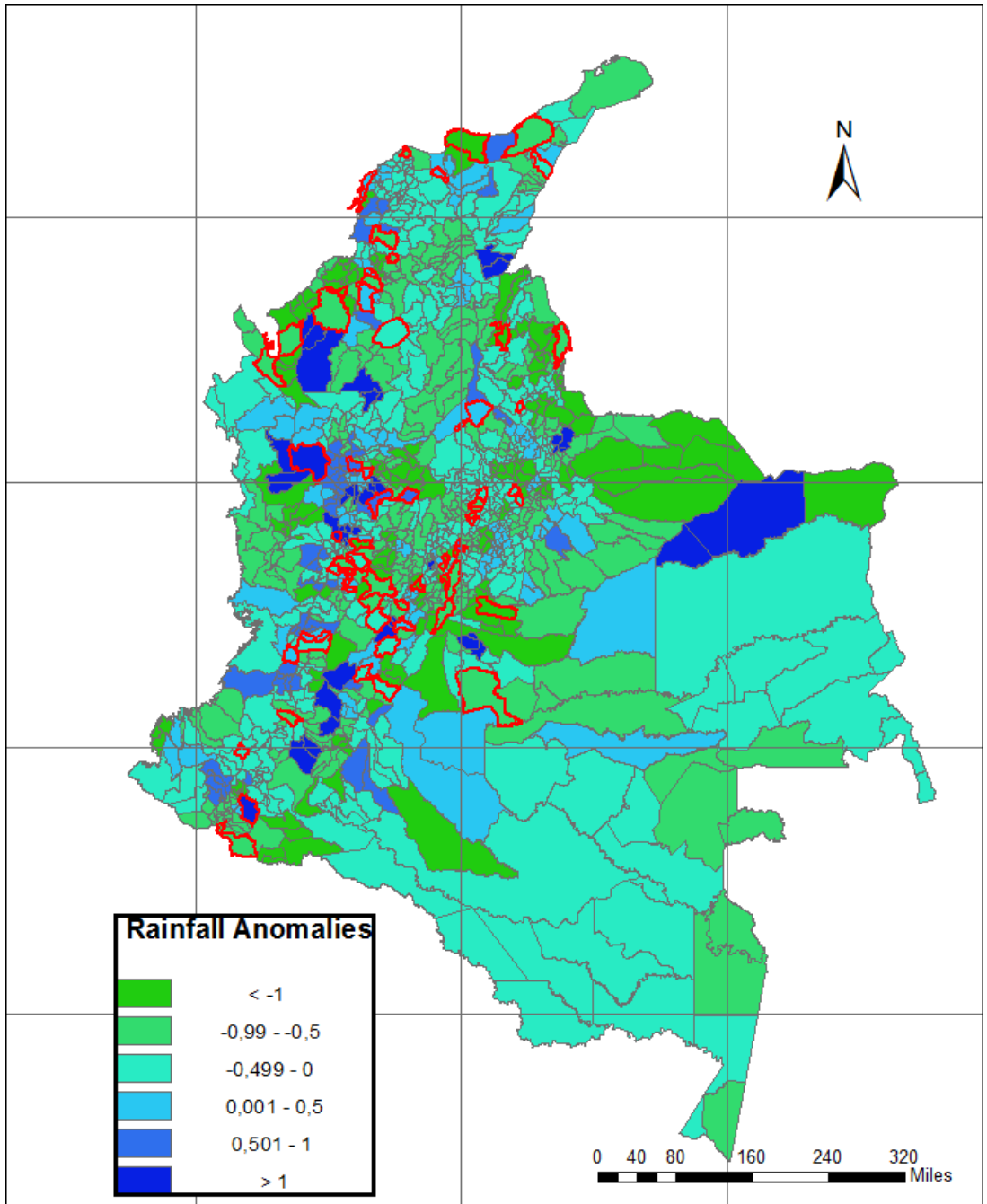
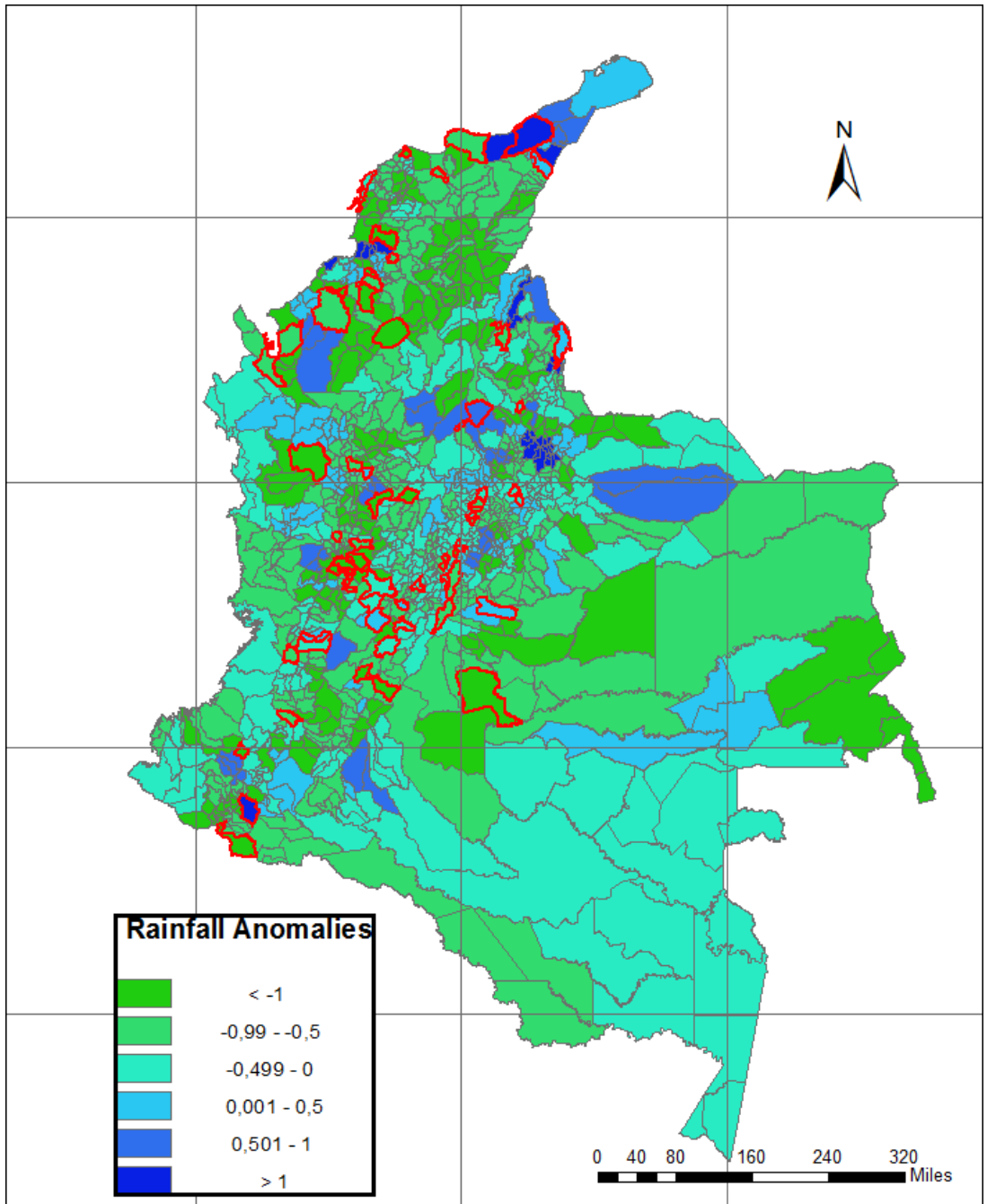
September 2009



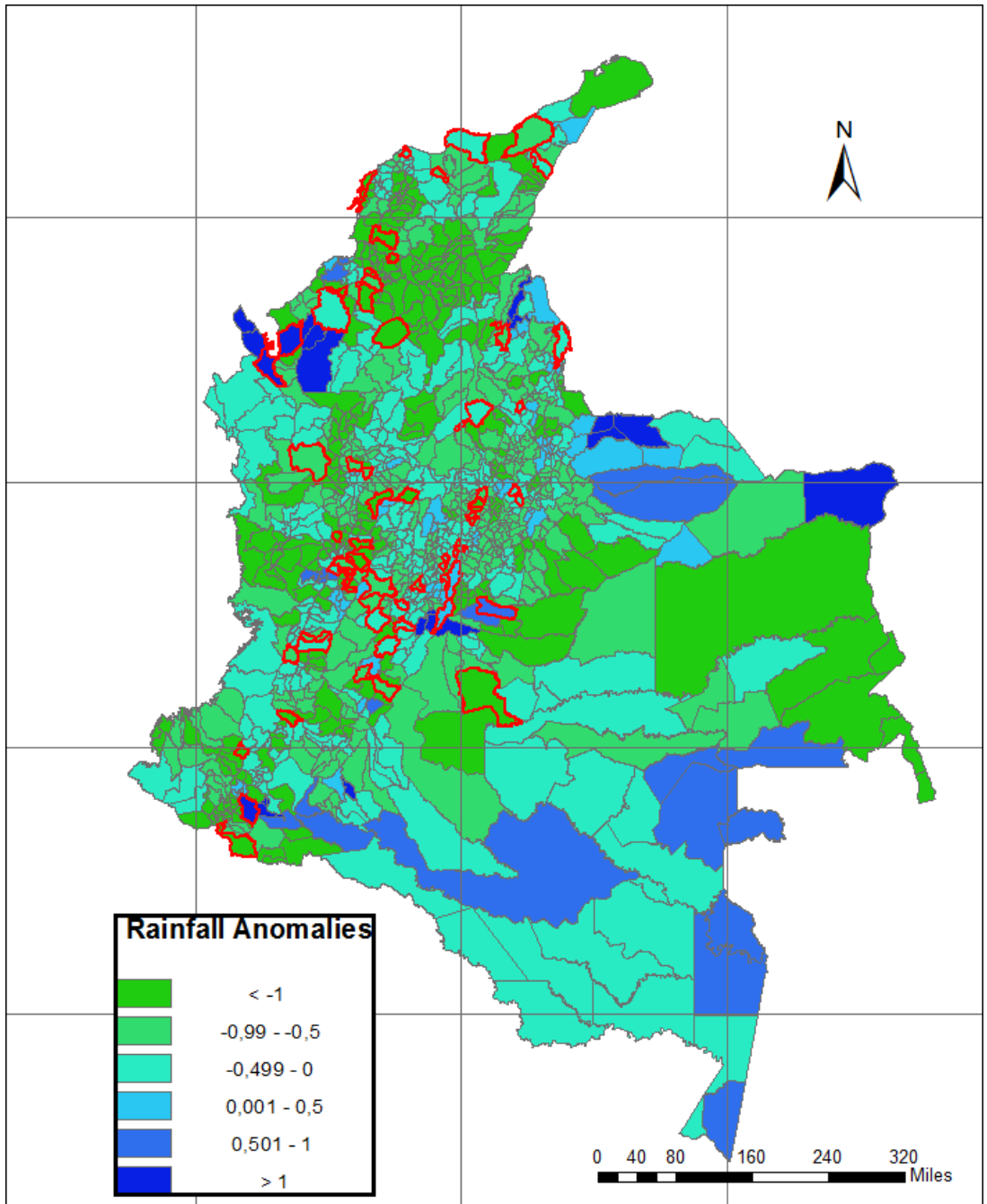
October 2009



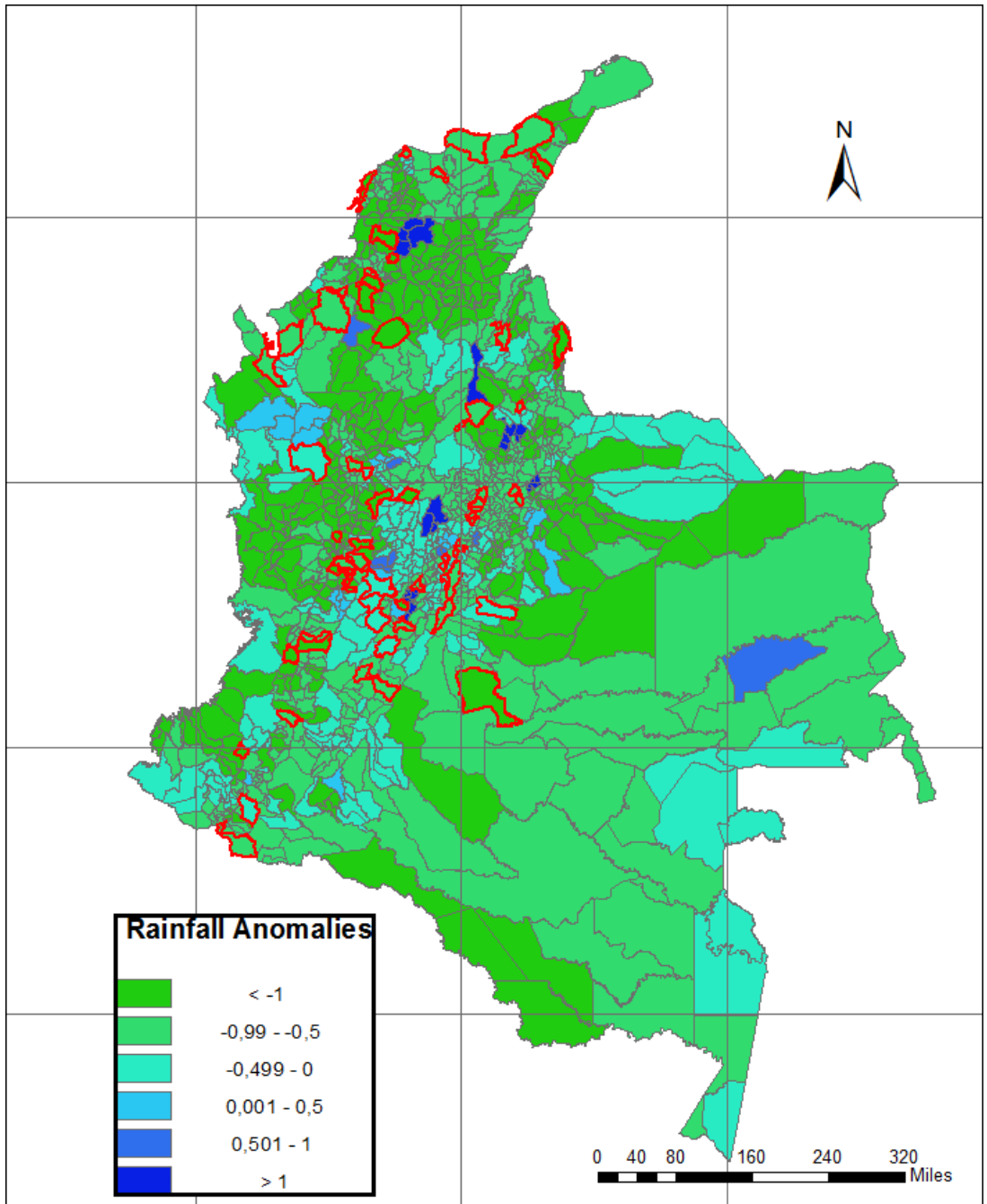
November 2009



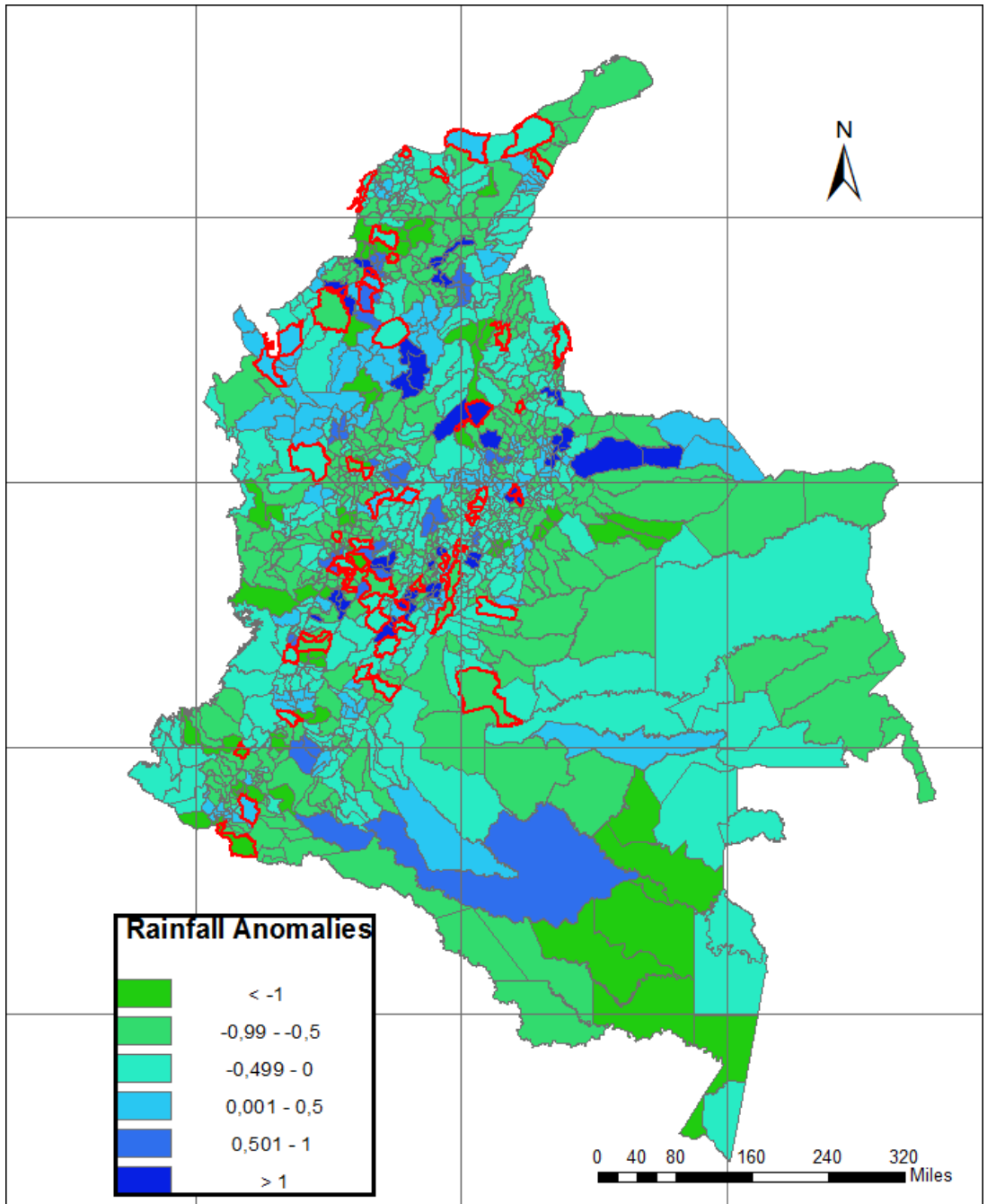
December 2009



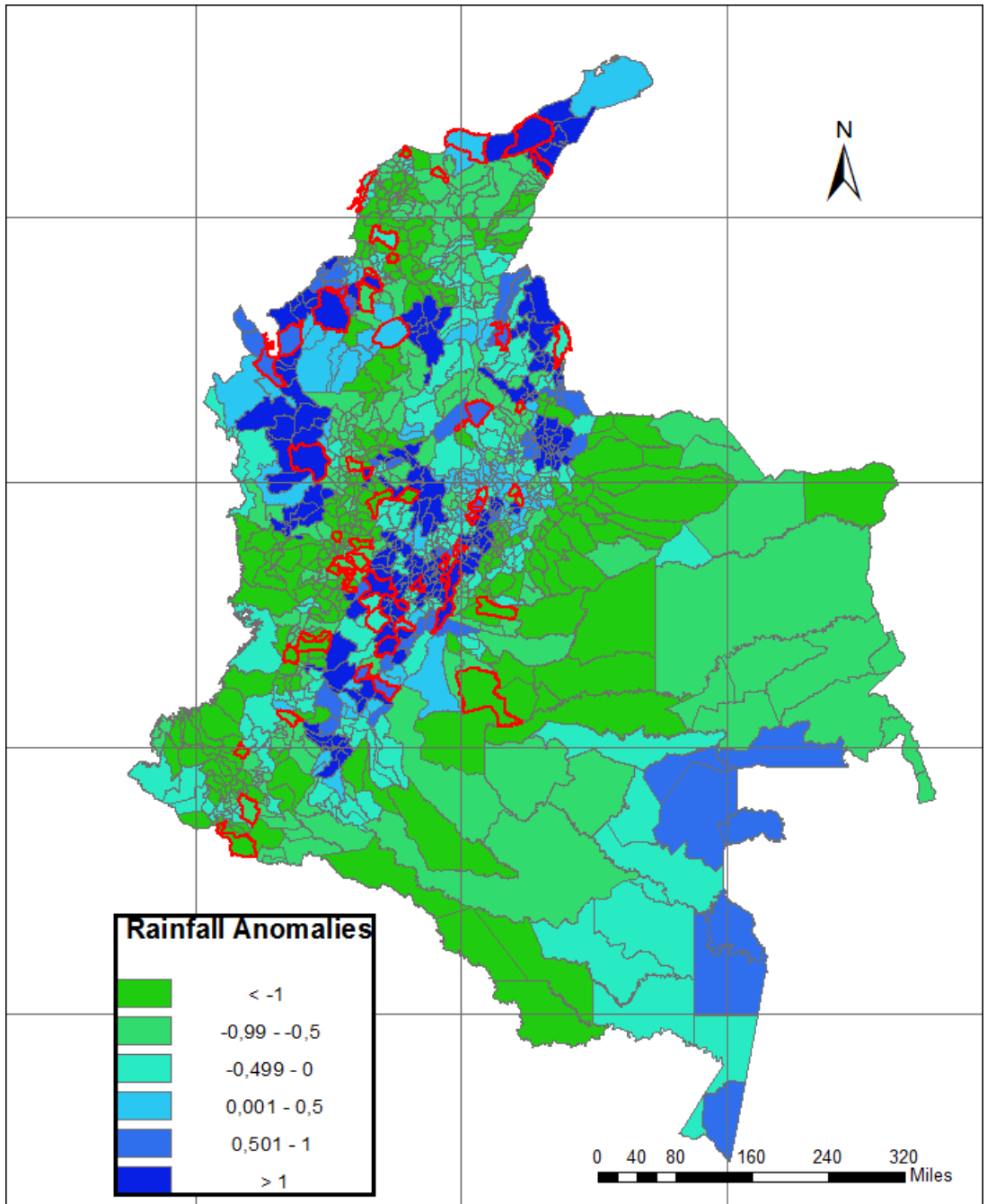
January 2010



February 2010



March 2010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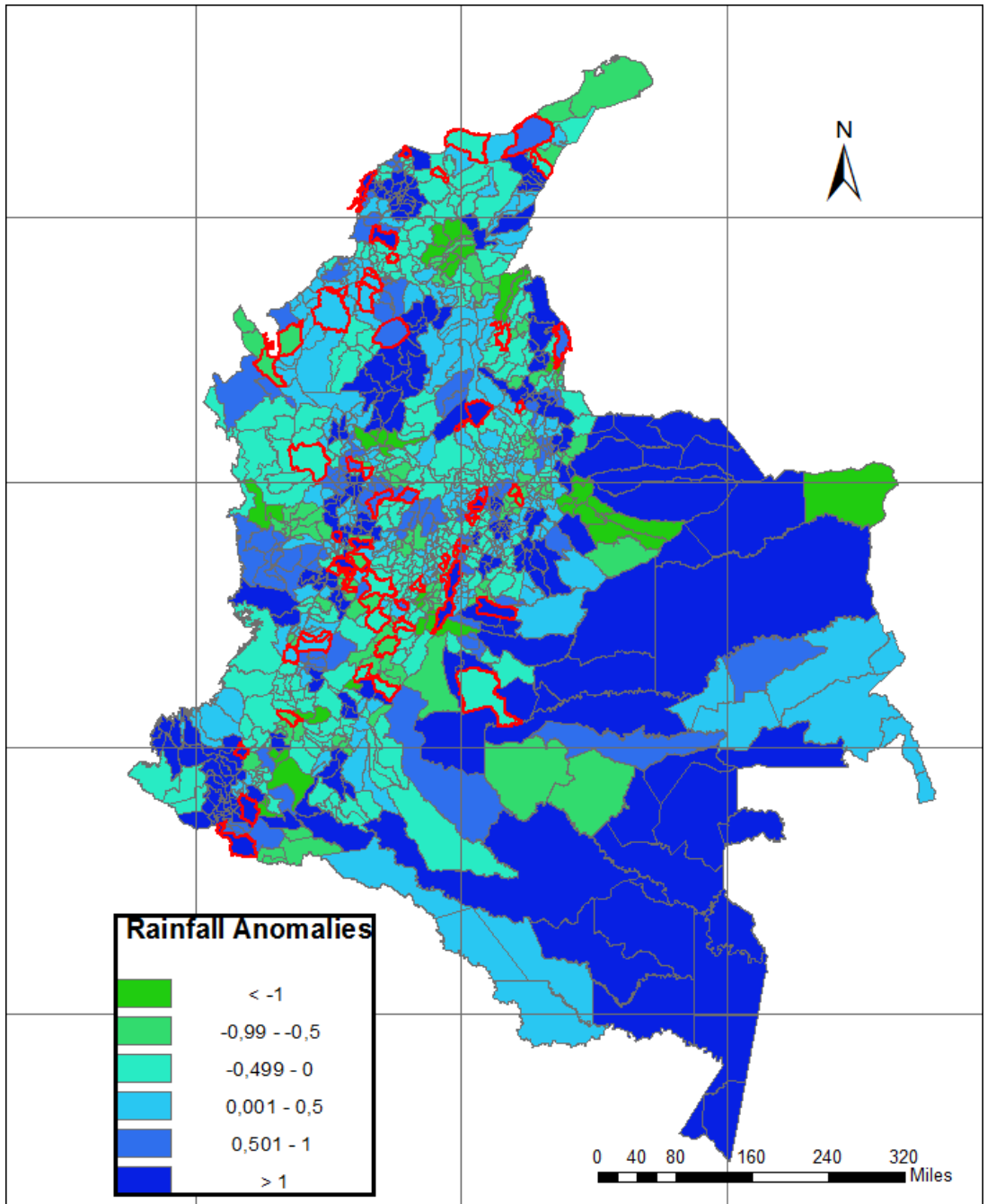
April 2010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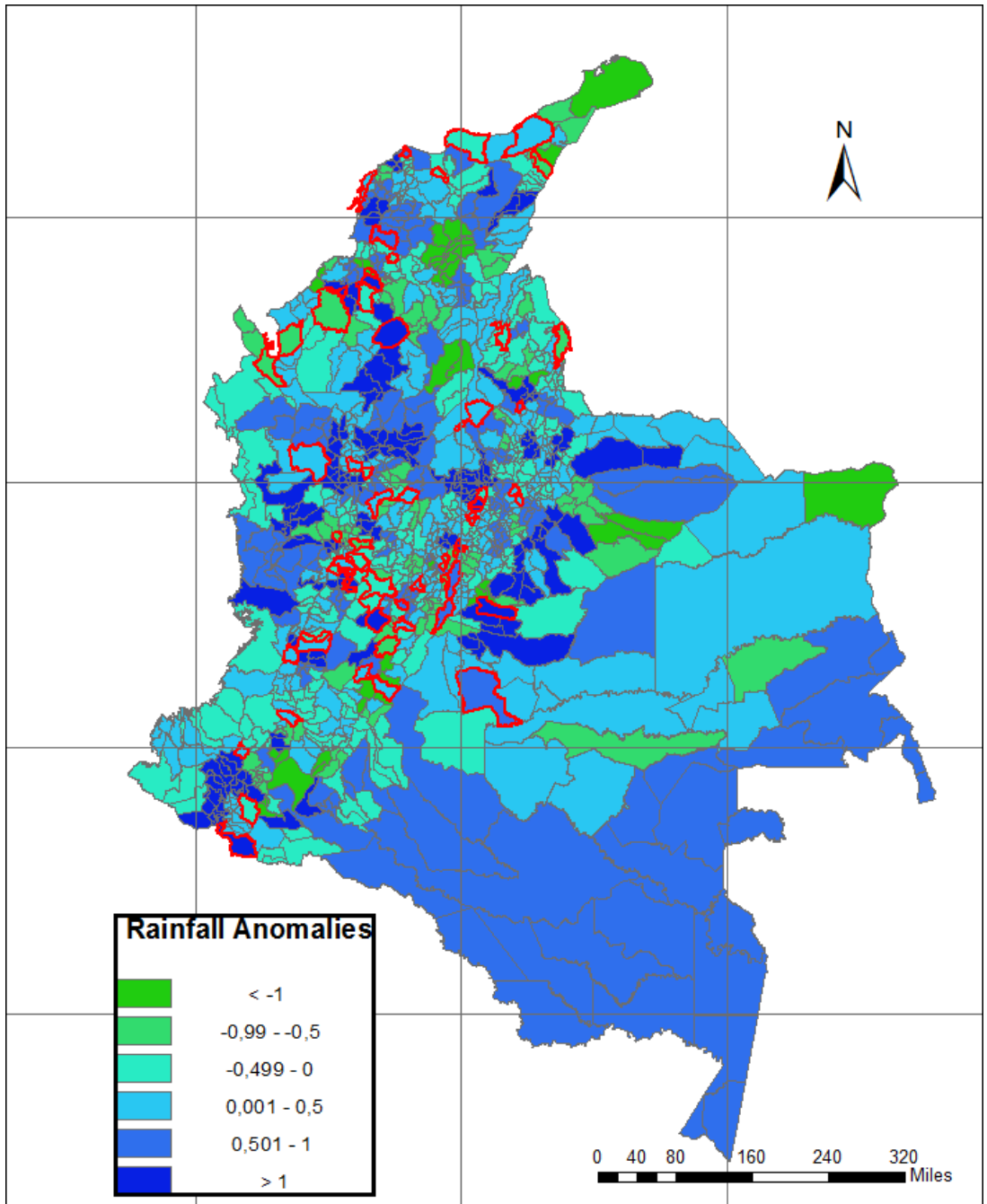
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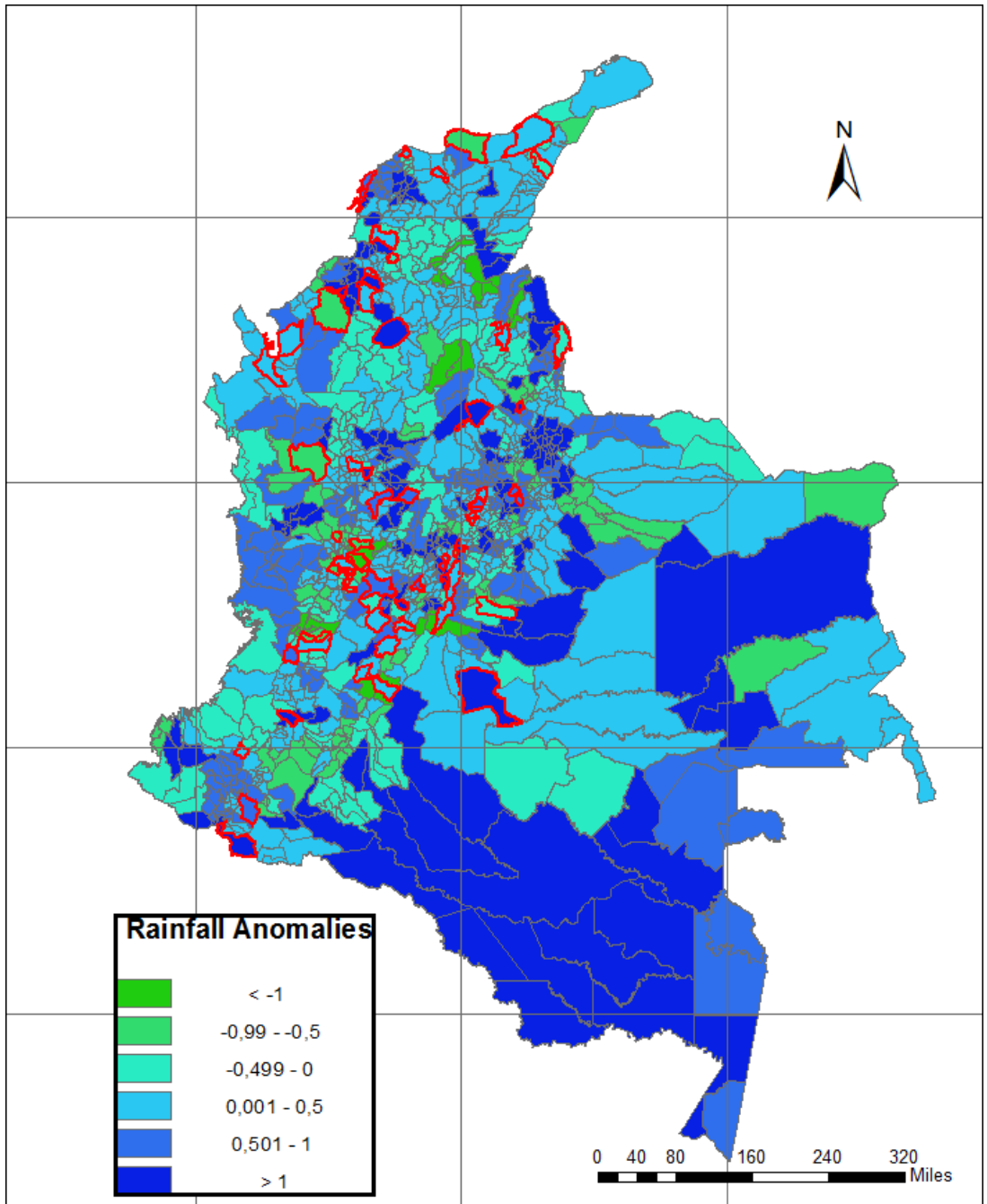
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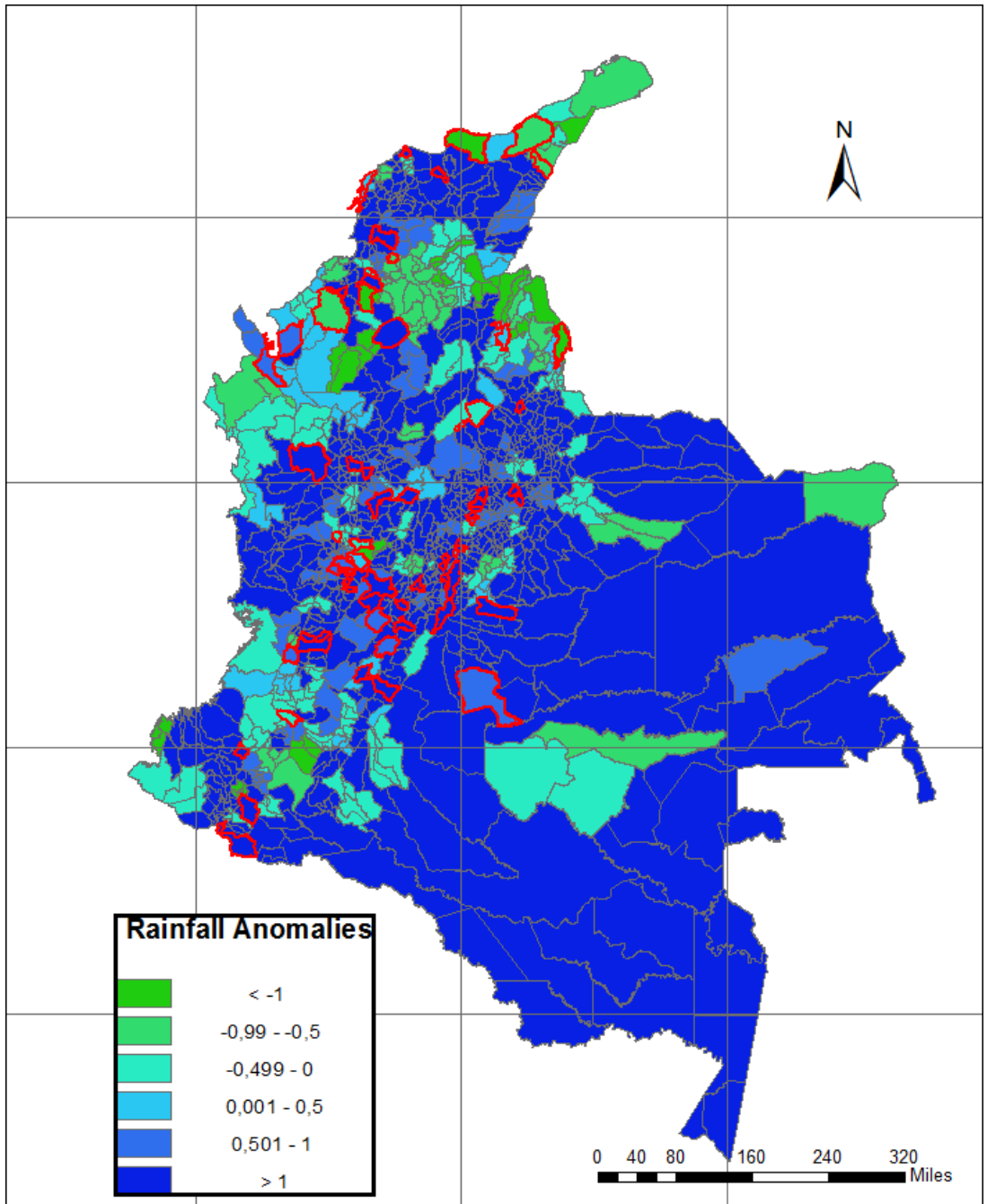
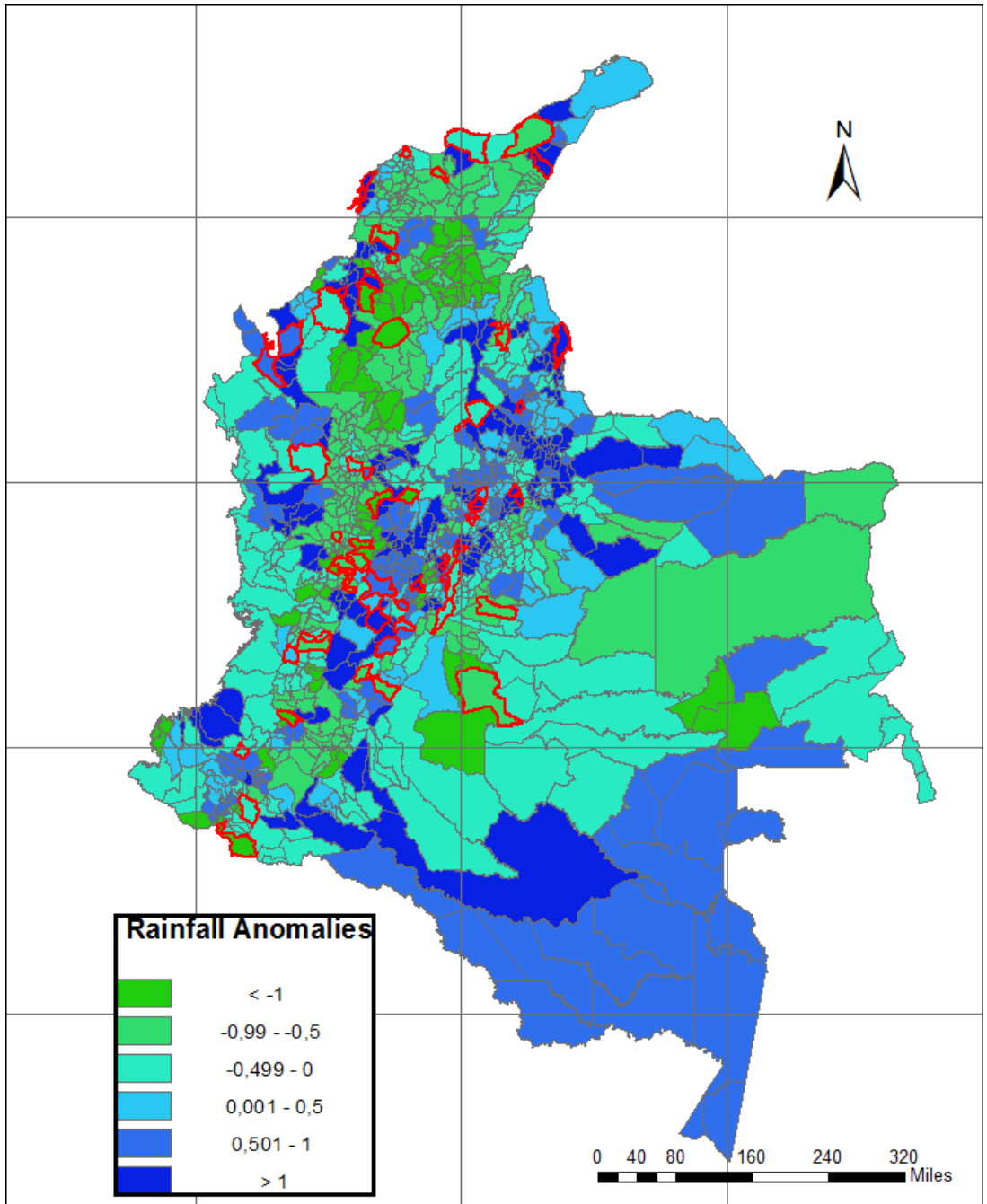
July 2010 (SOI>20)



August 2010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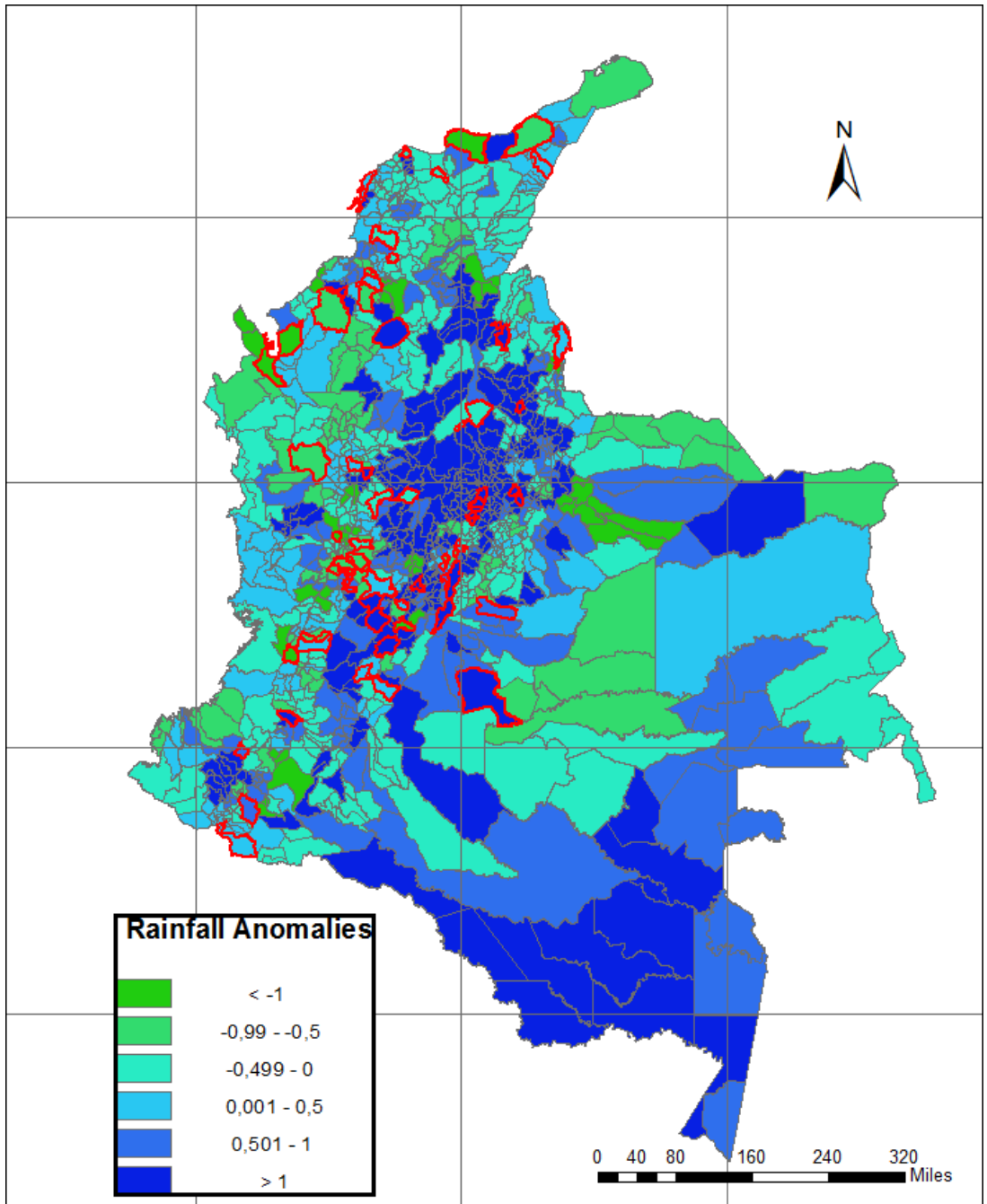

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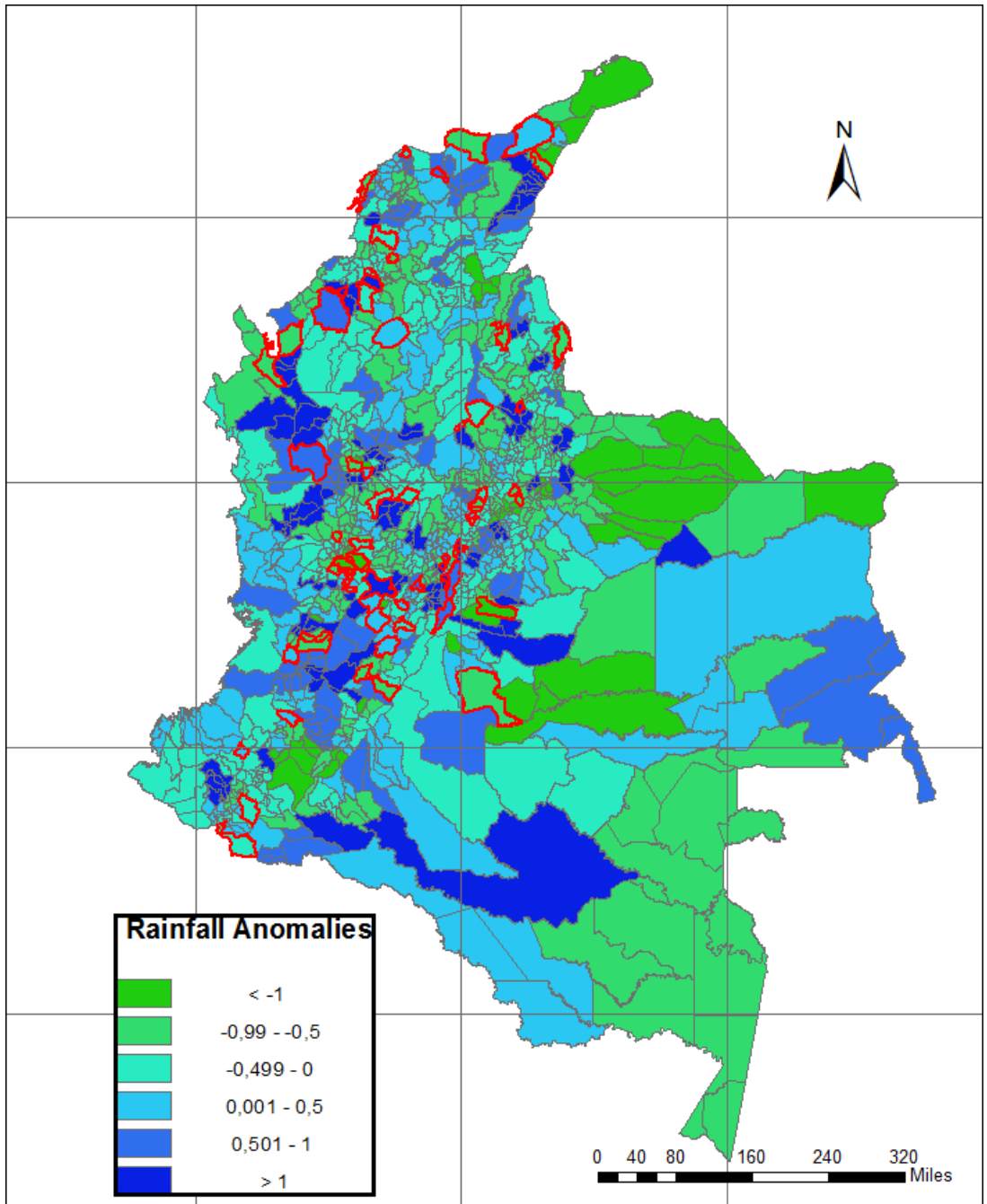
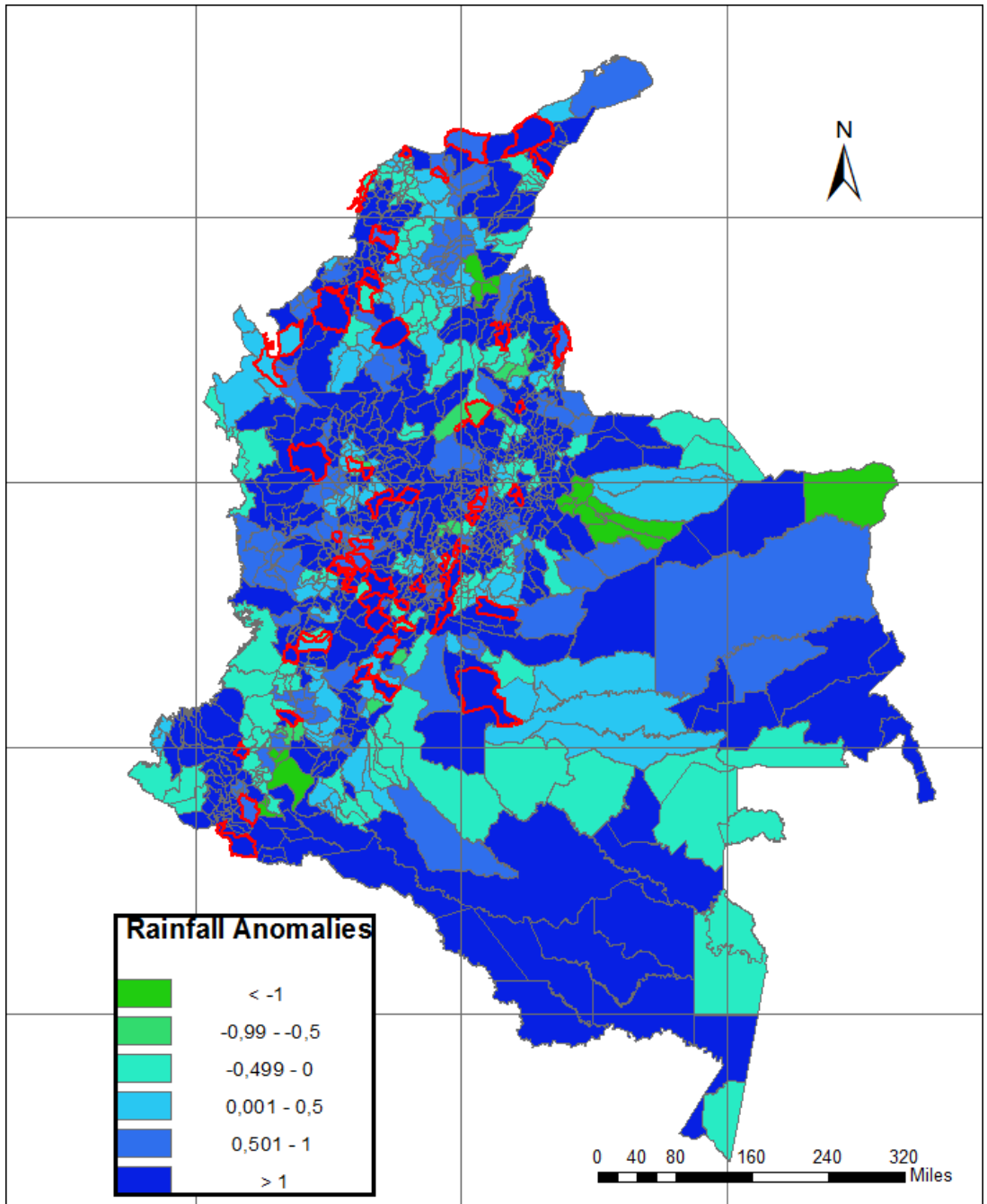


November 2010



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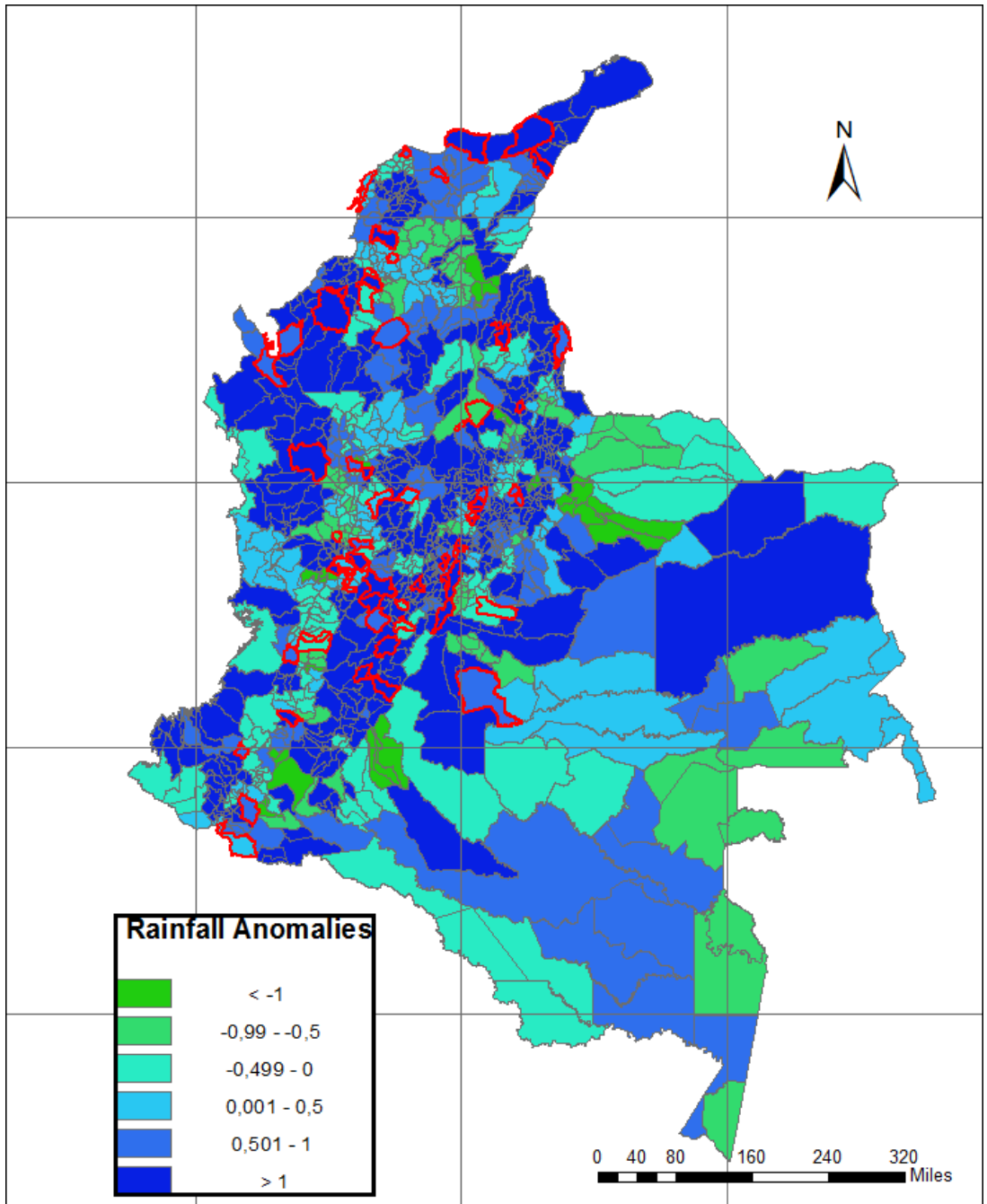
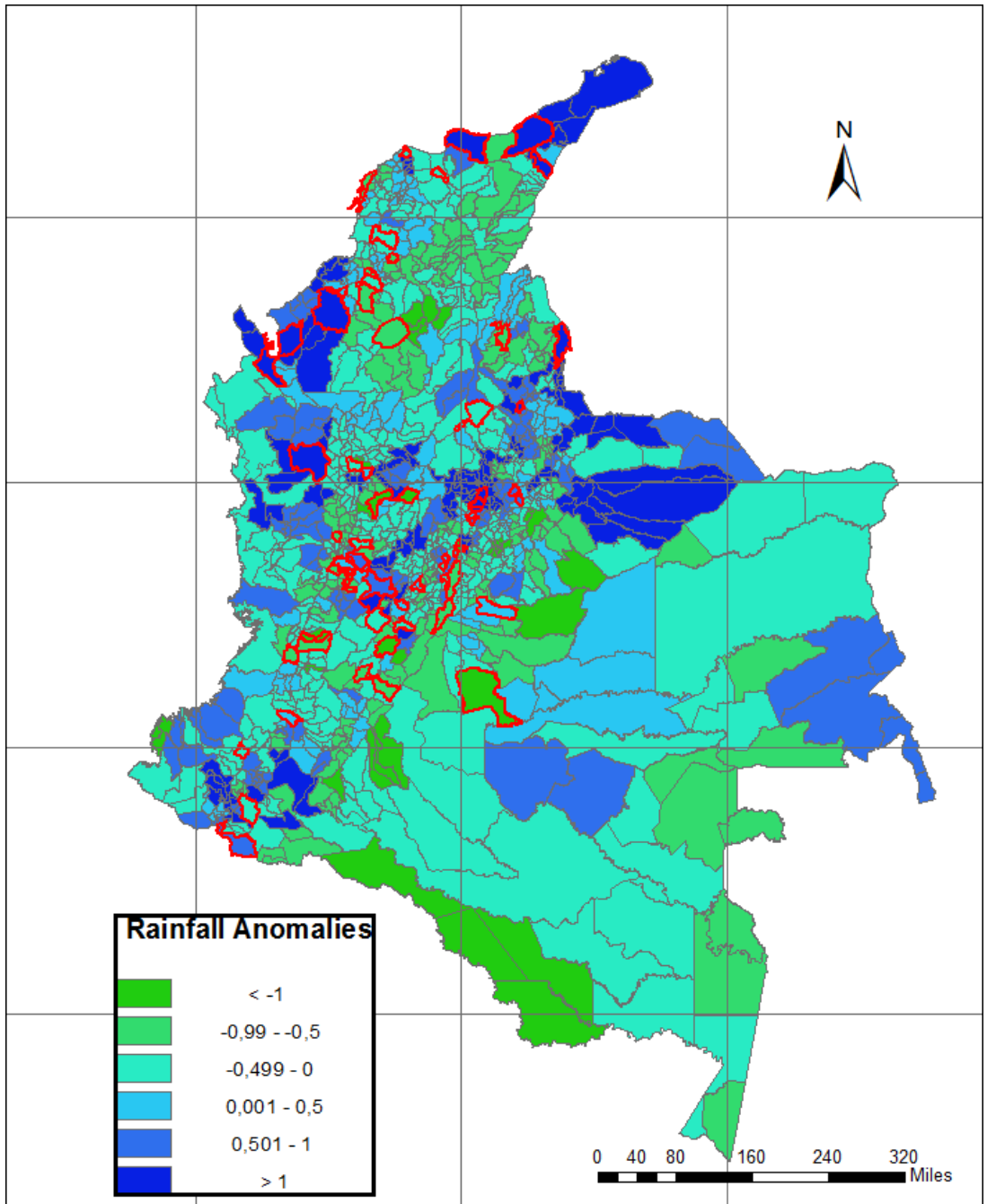


January 2011



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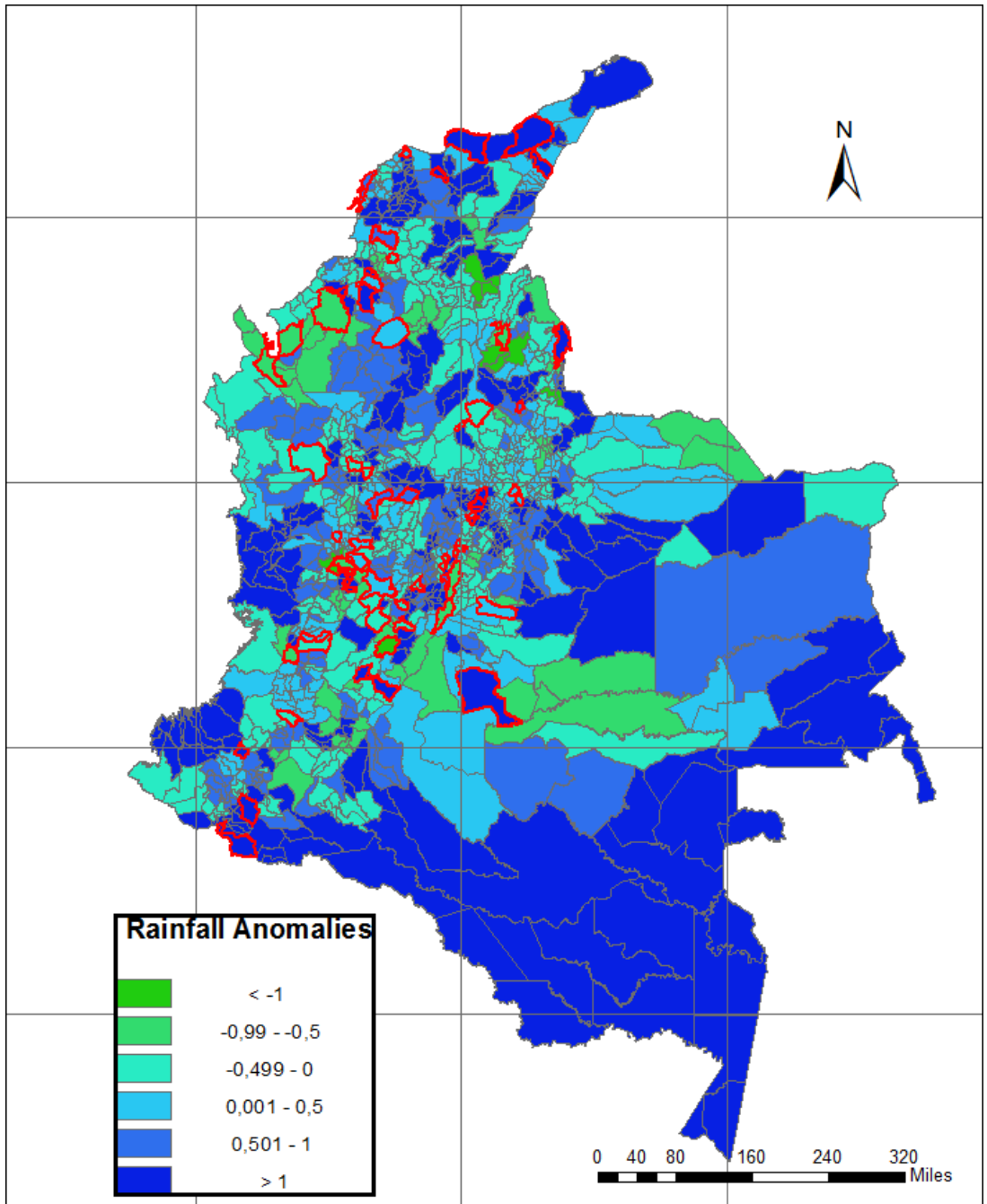

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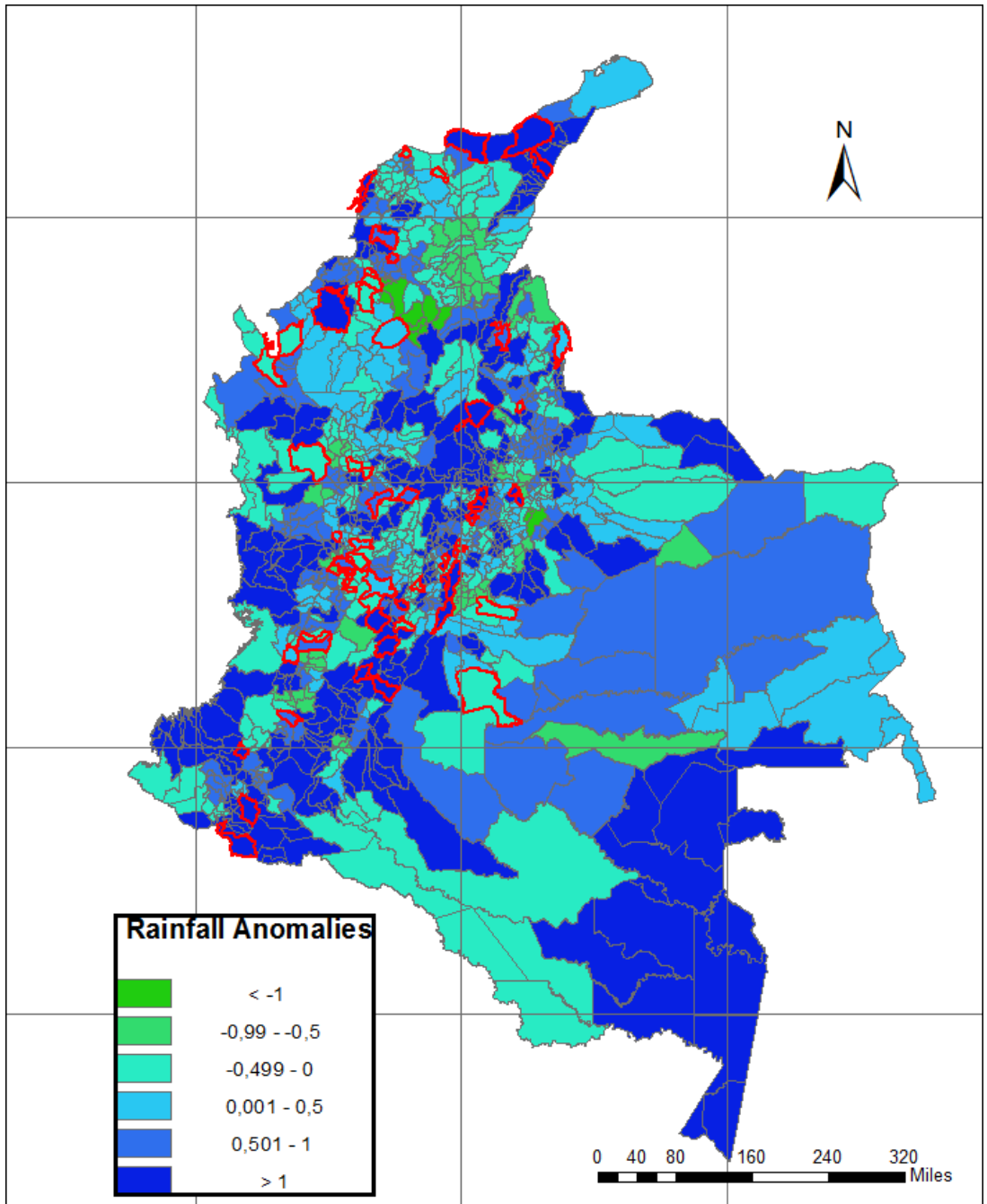

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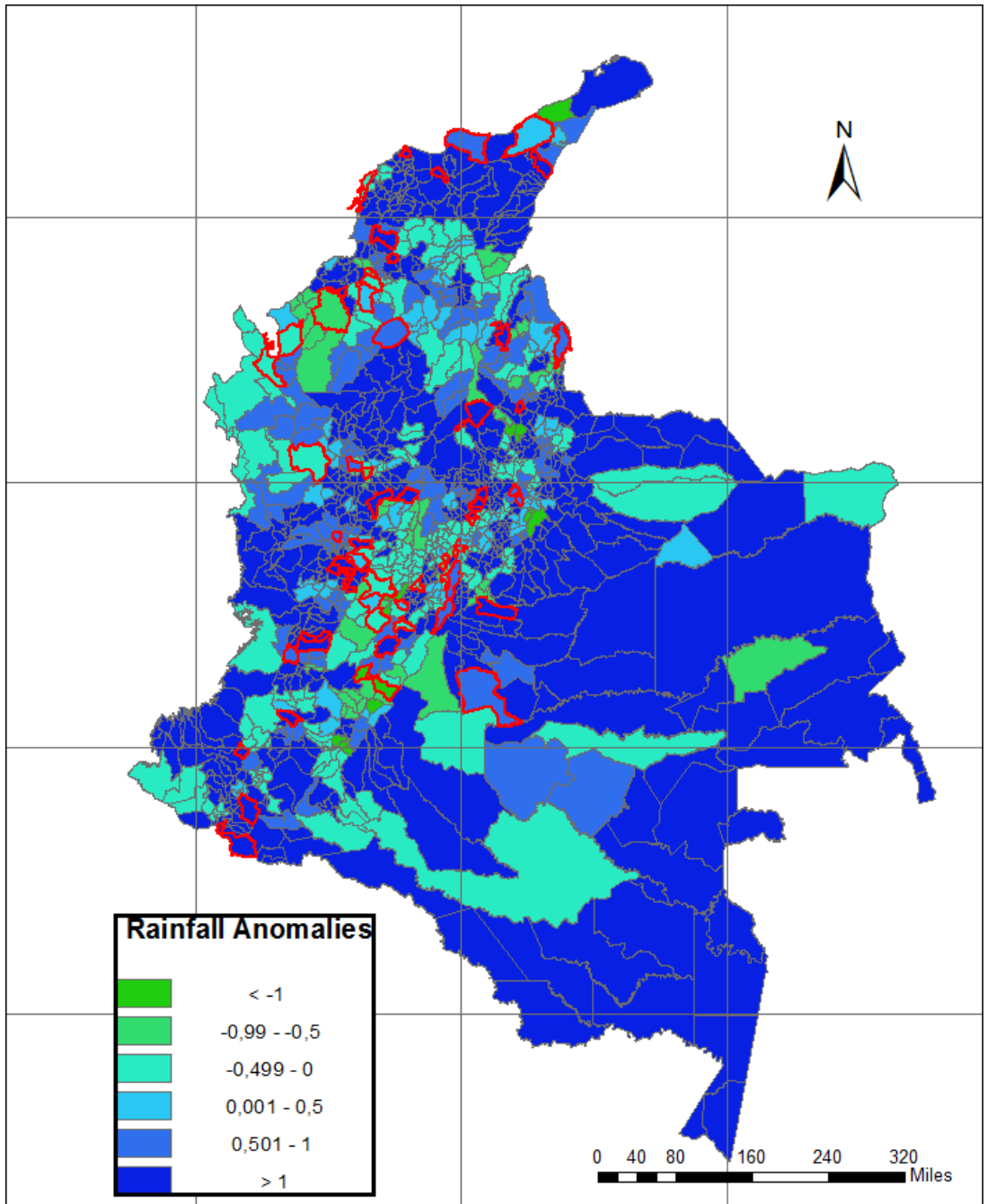

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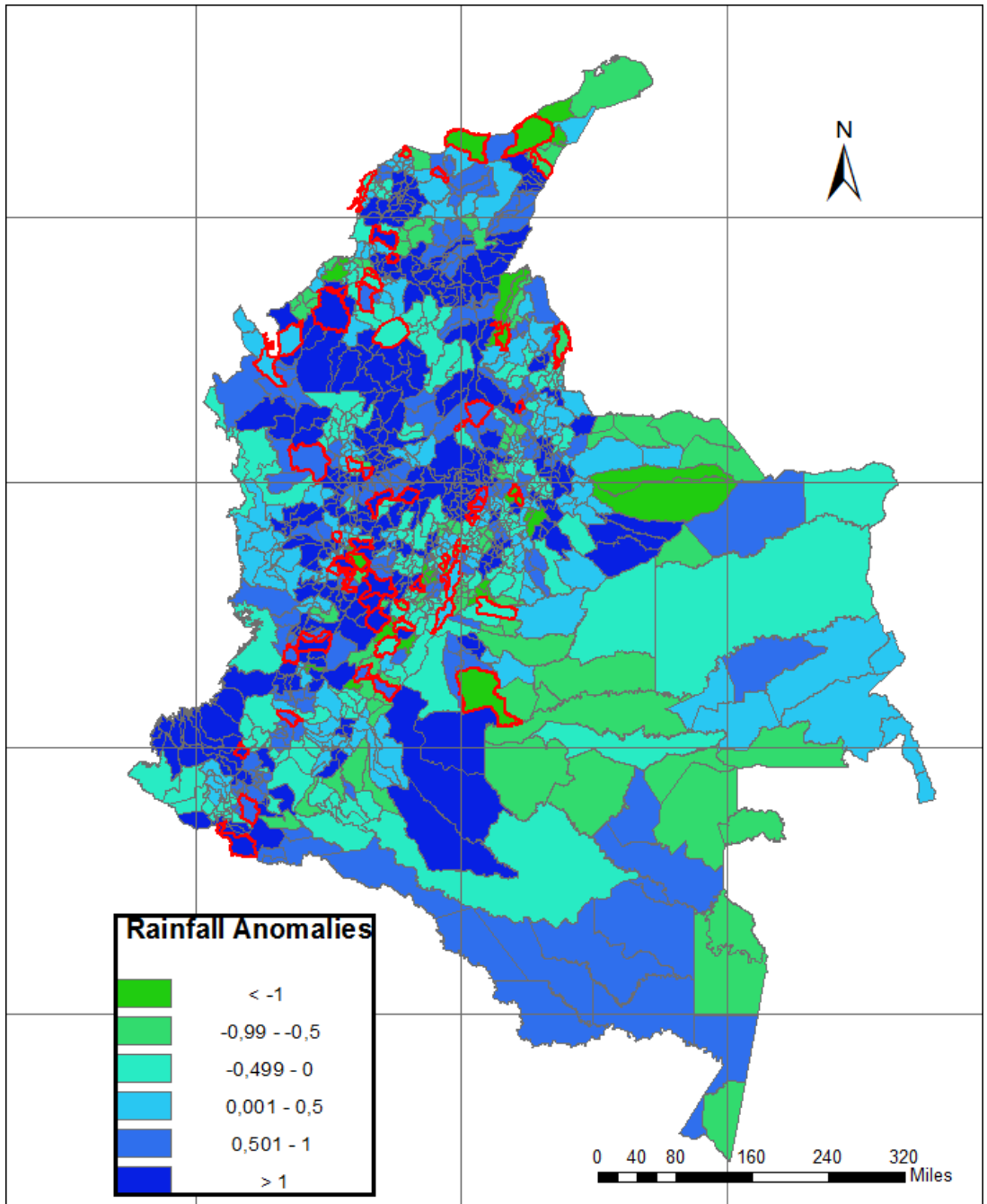
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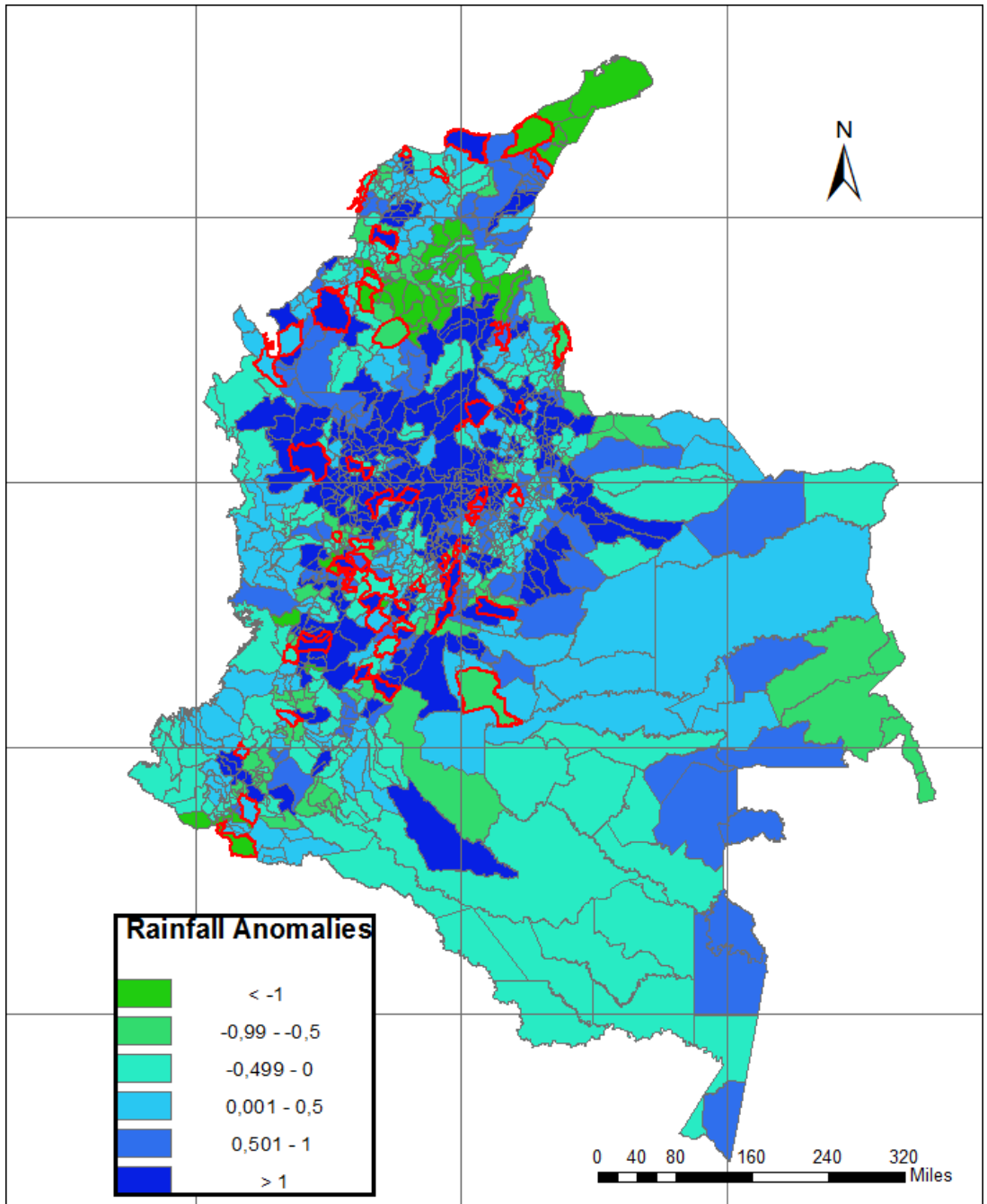
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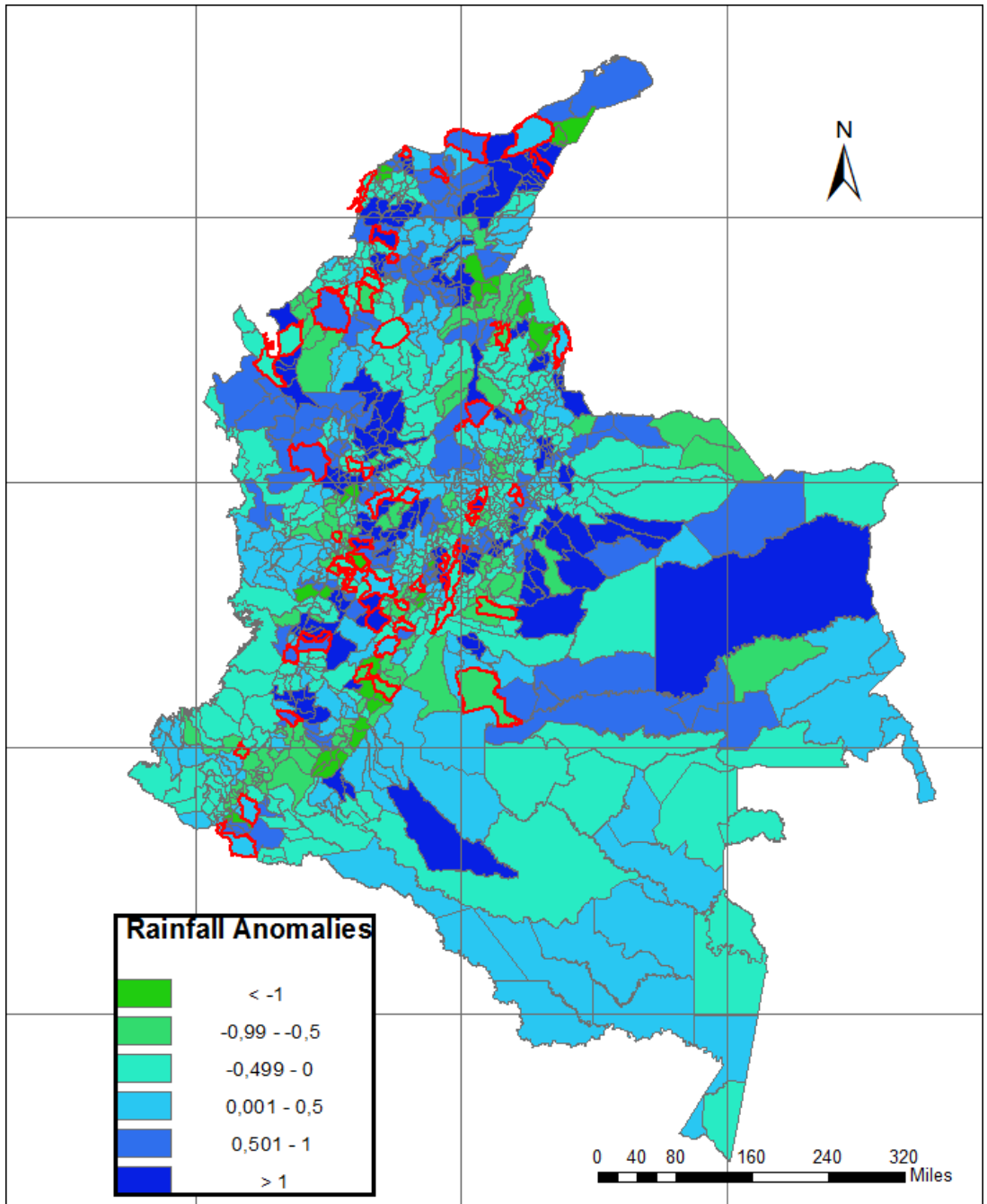
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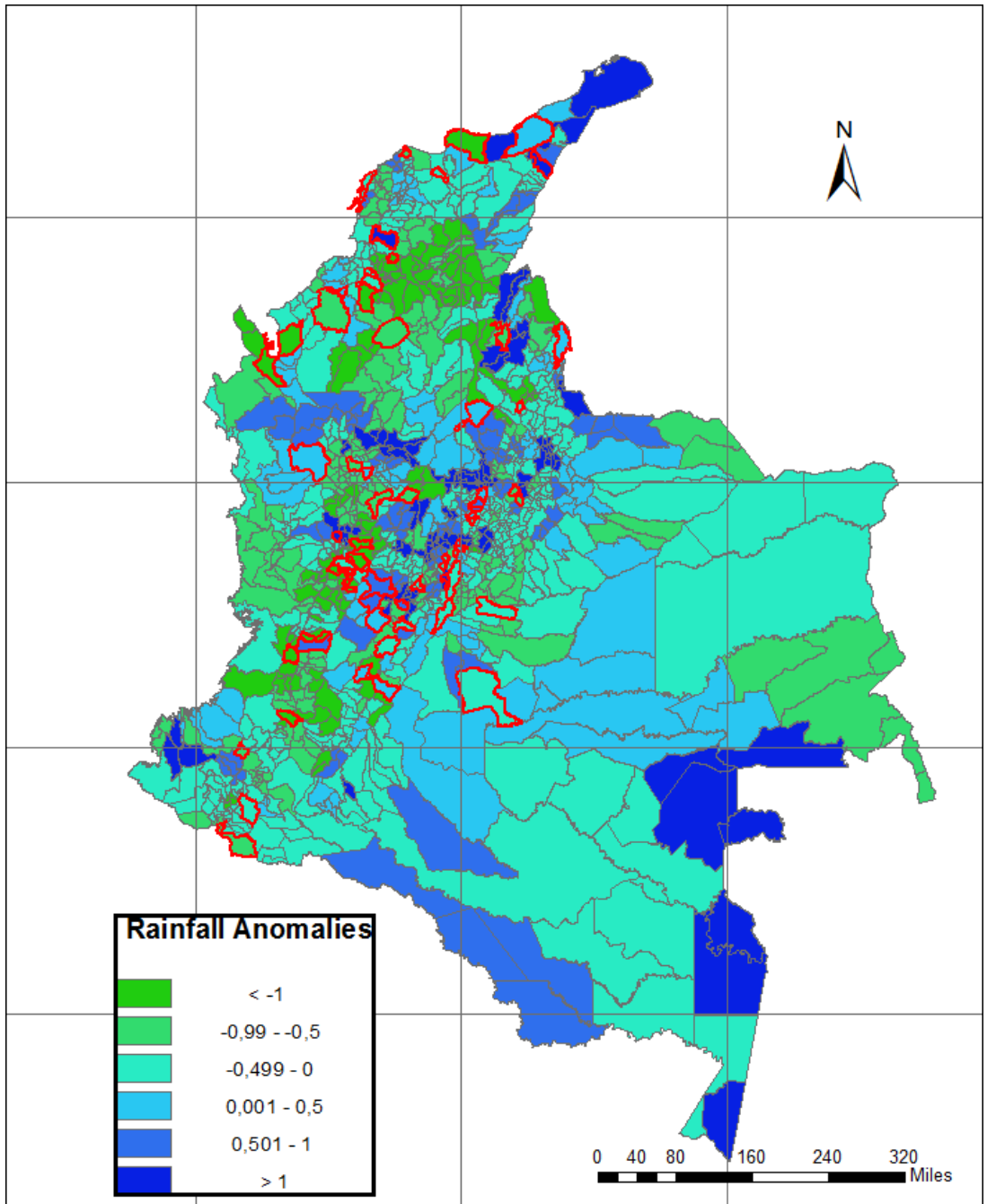
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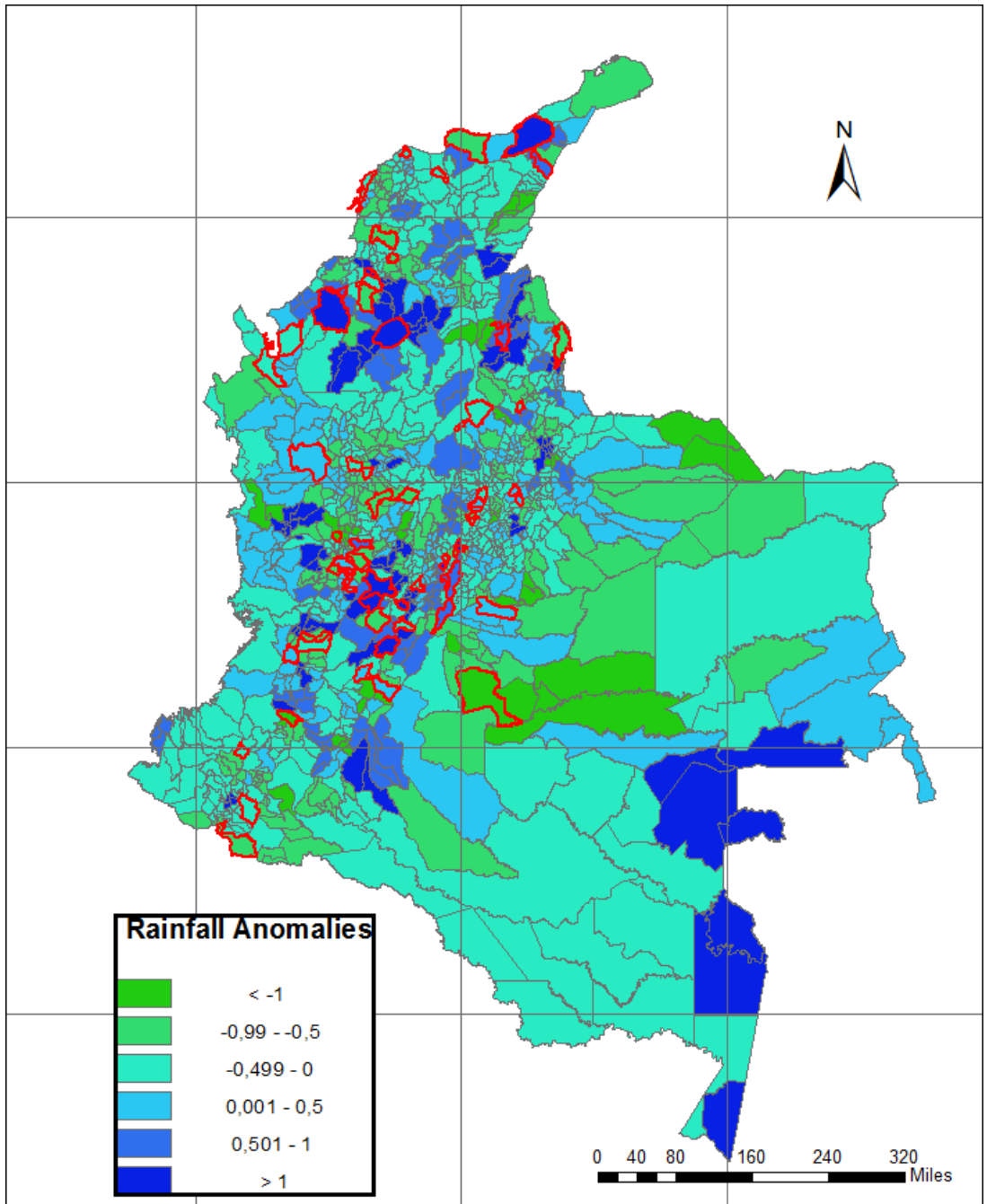

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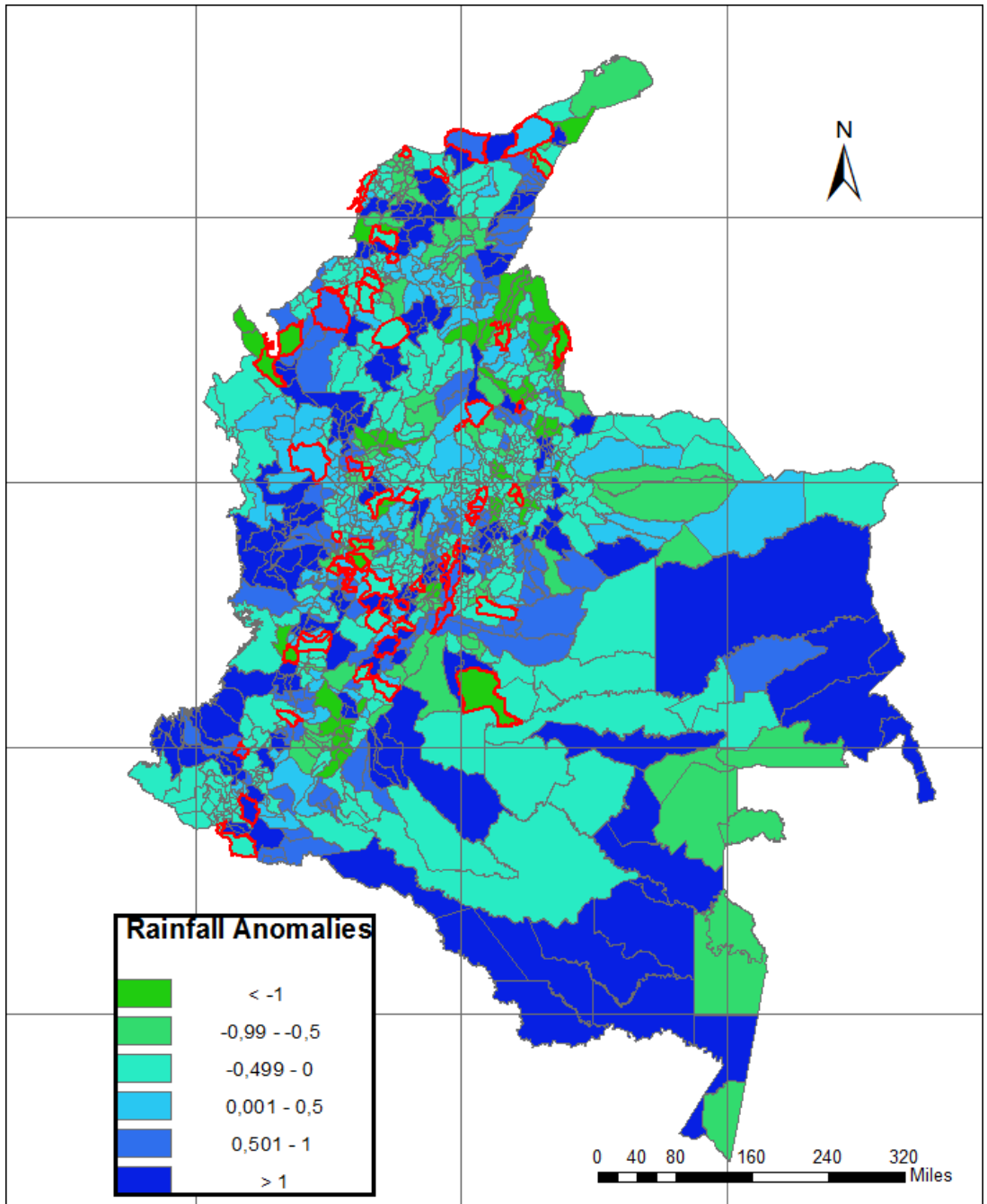
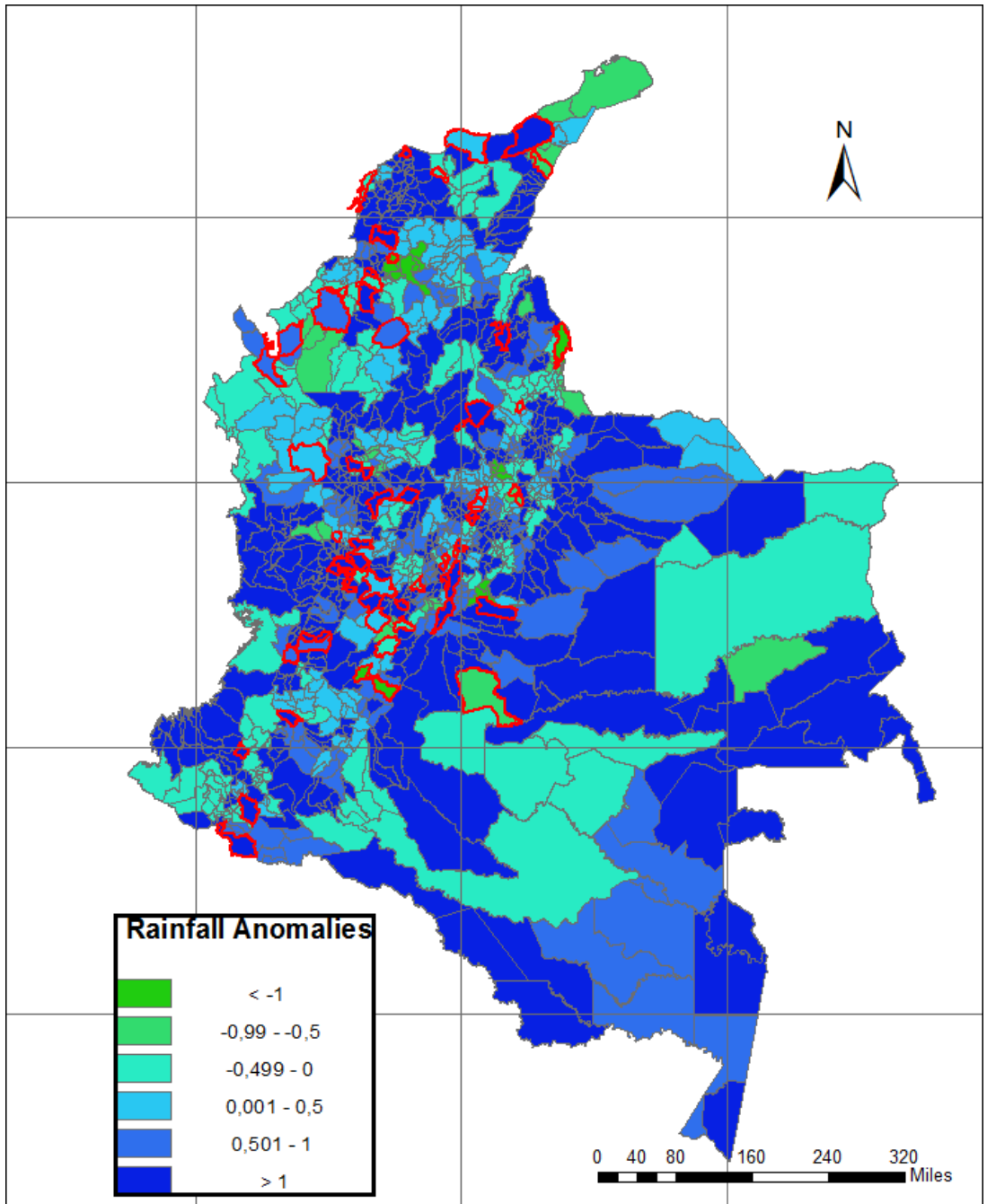


November 2011



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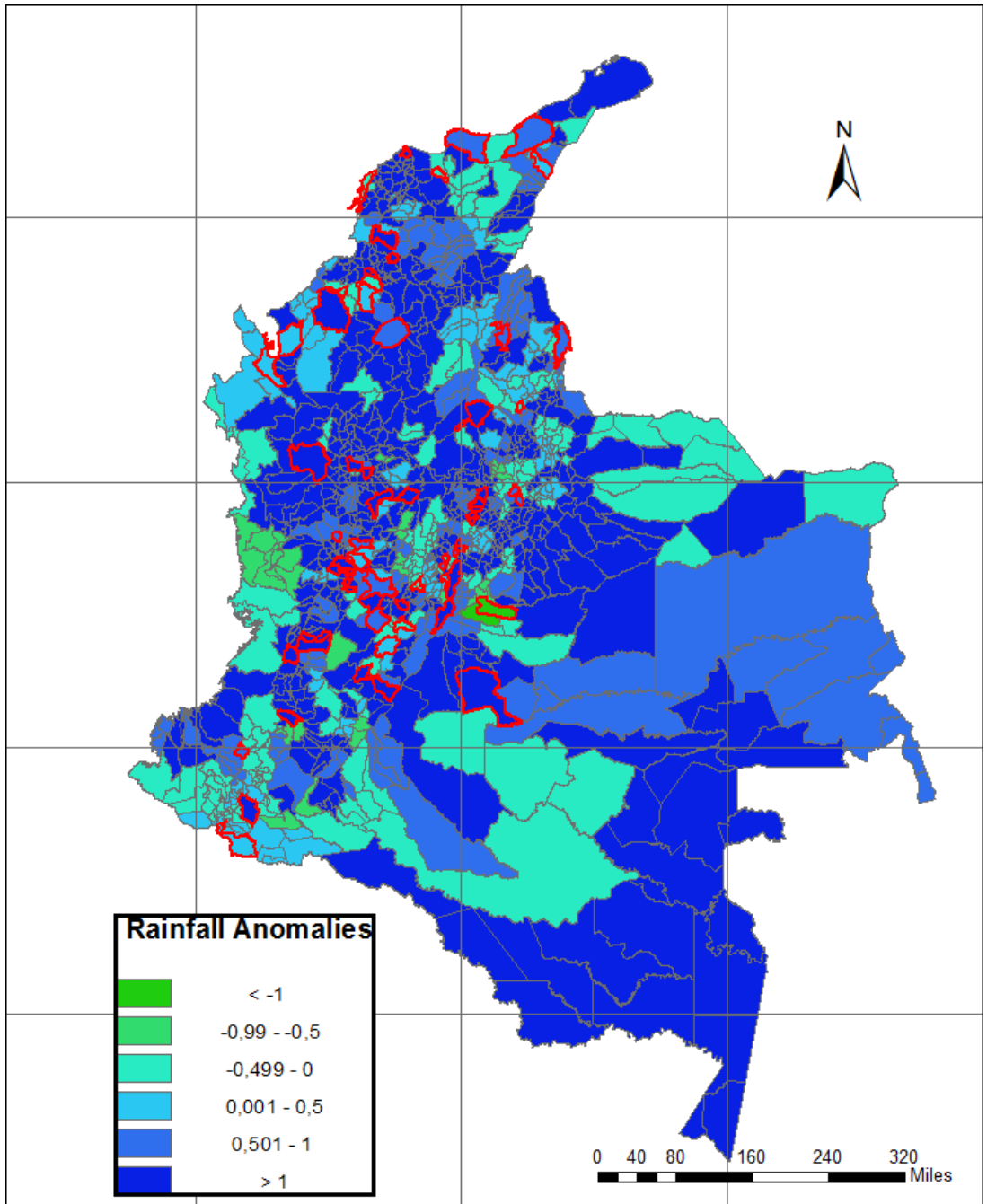

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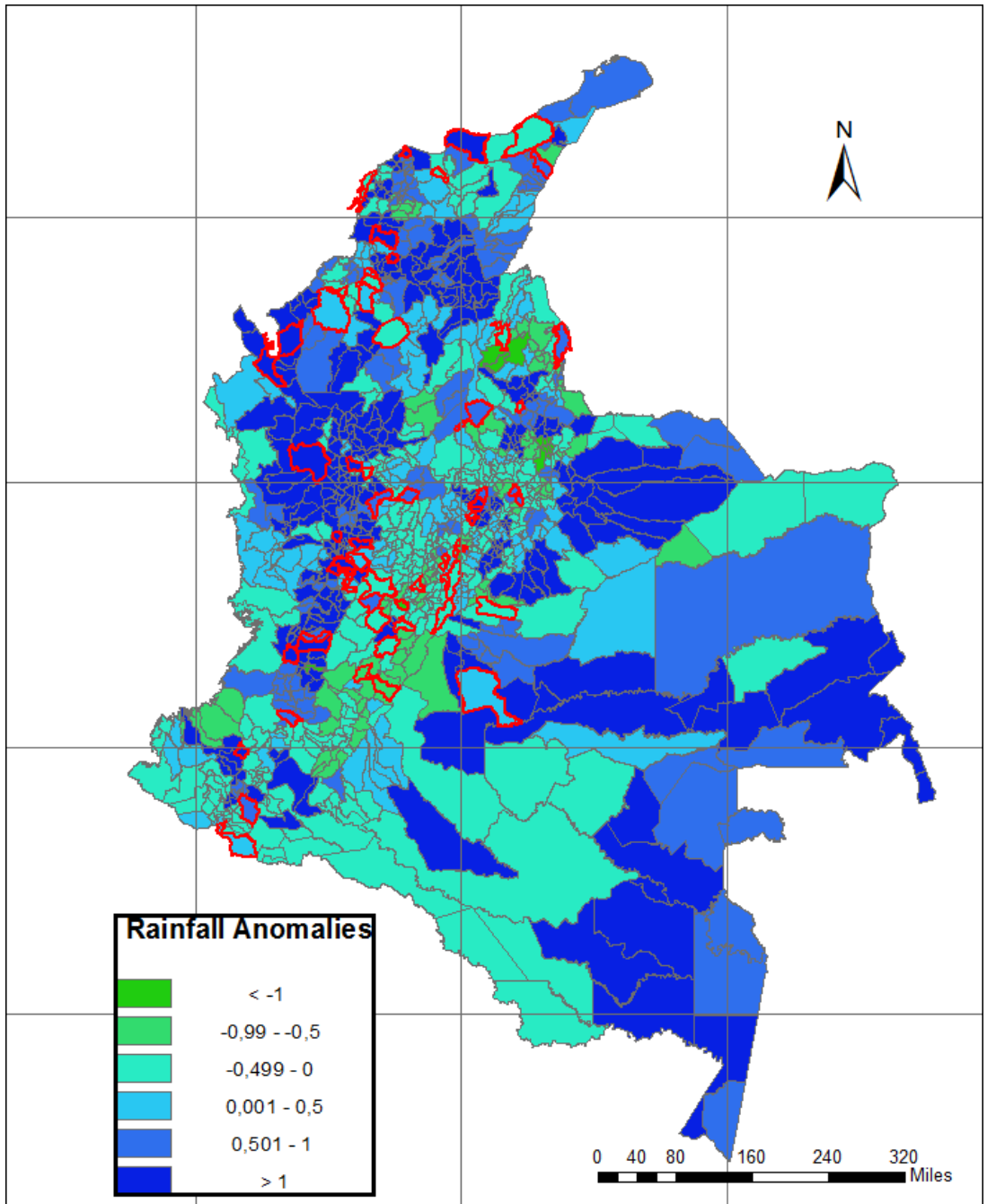

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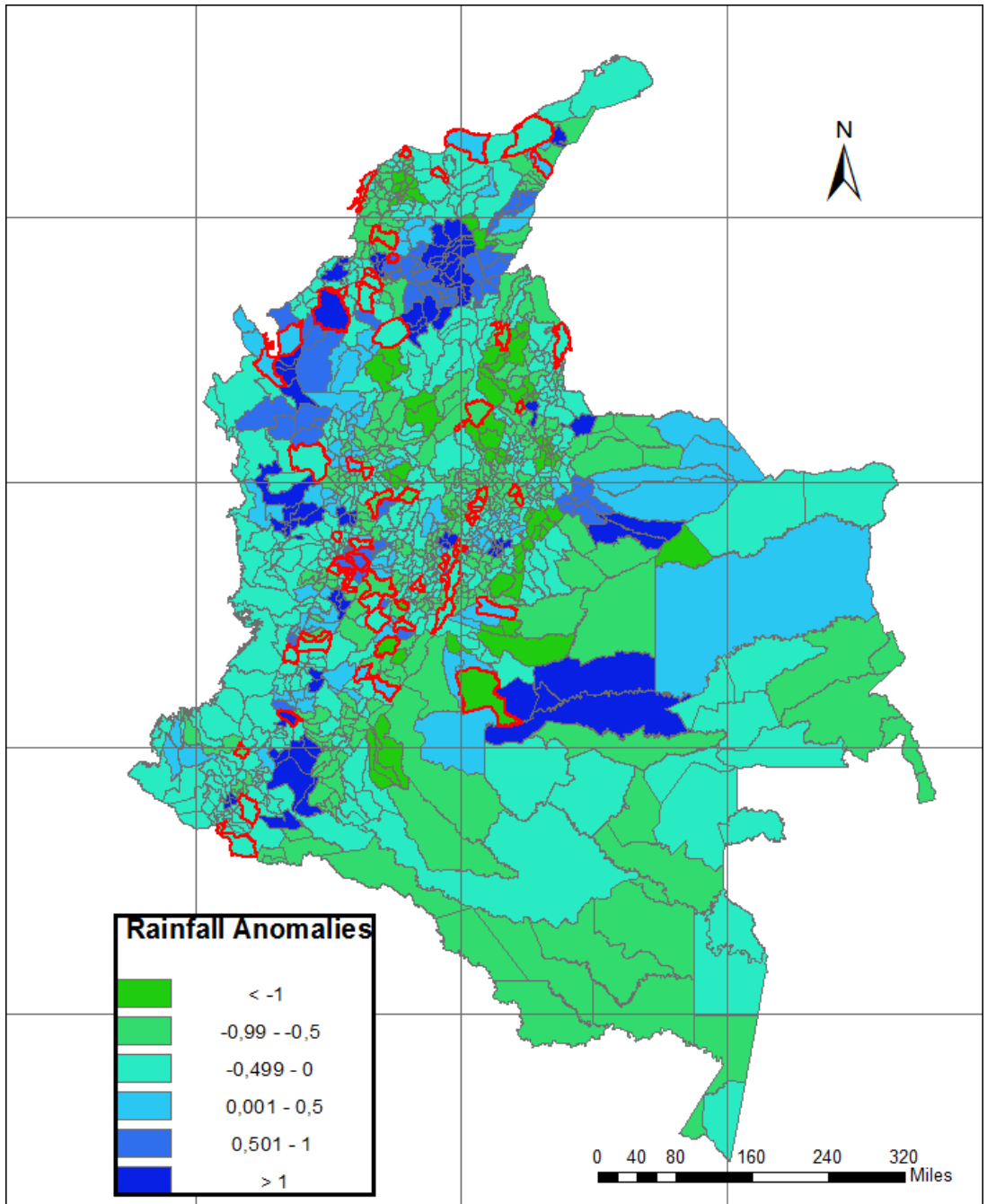

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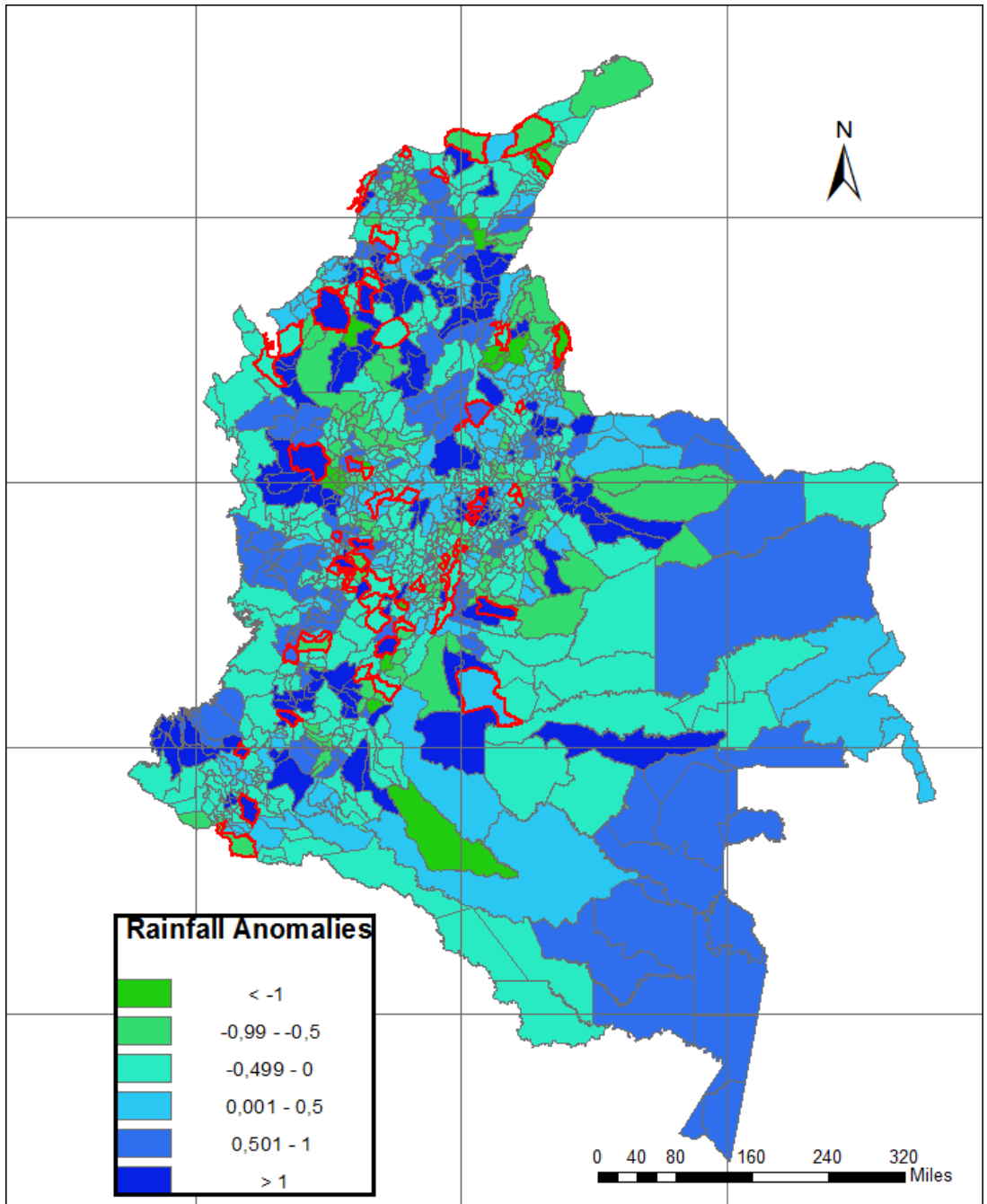
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Rainfall Anomalies
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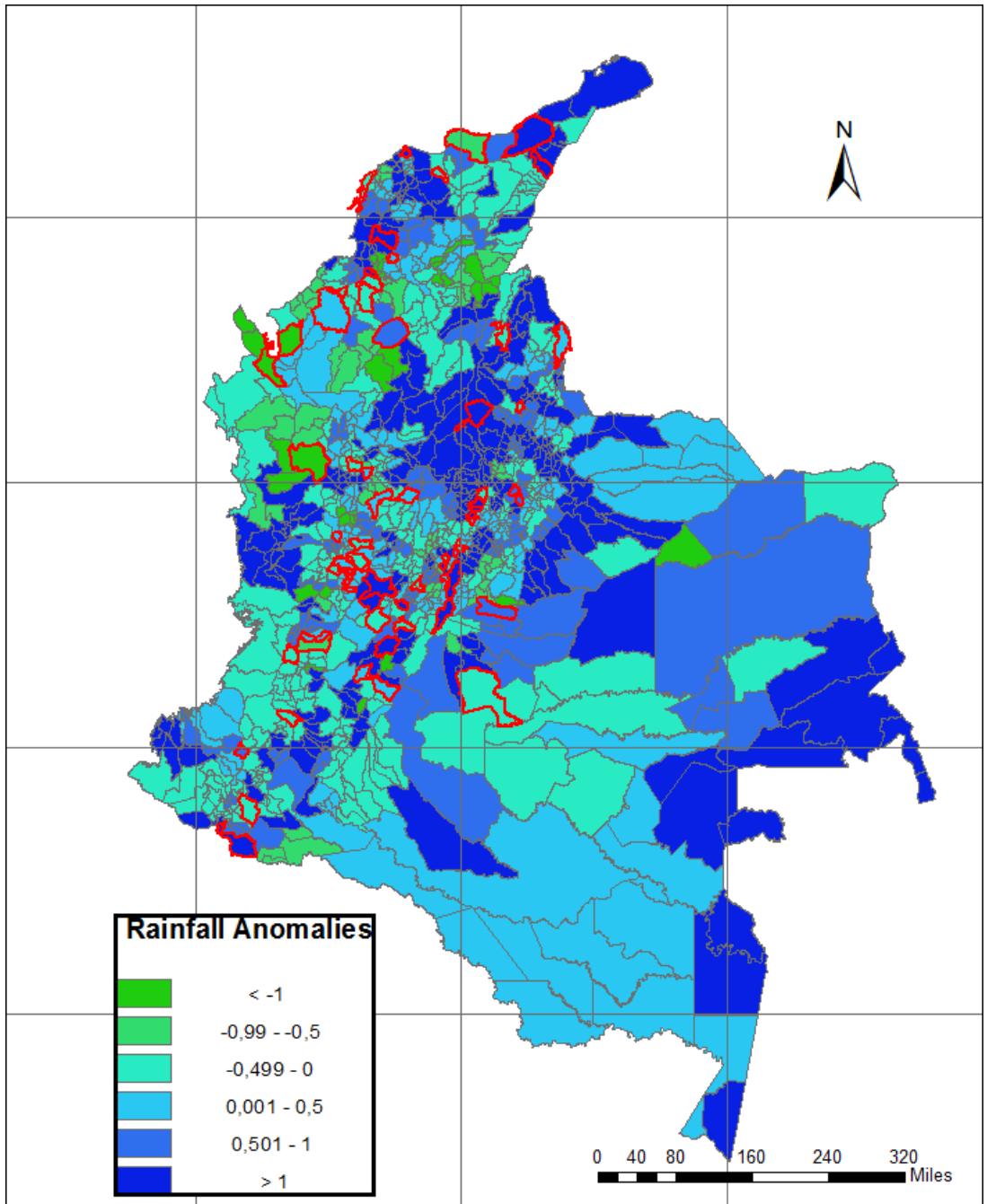
-0,499 - 0
0,001 - 0,5
0,501 - 1
> 1
0 40 80 160 240 320
Miles

April 2012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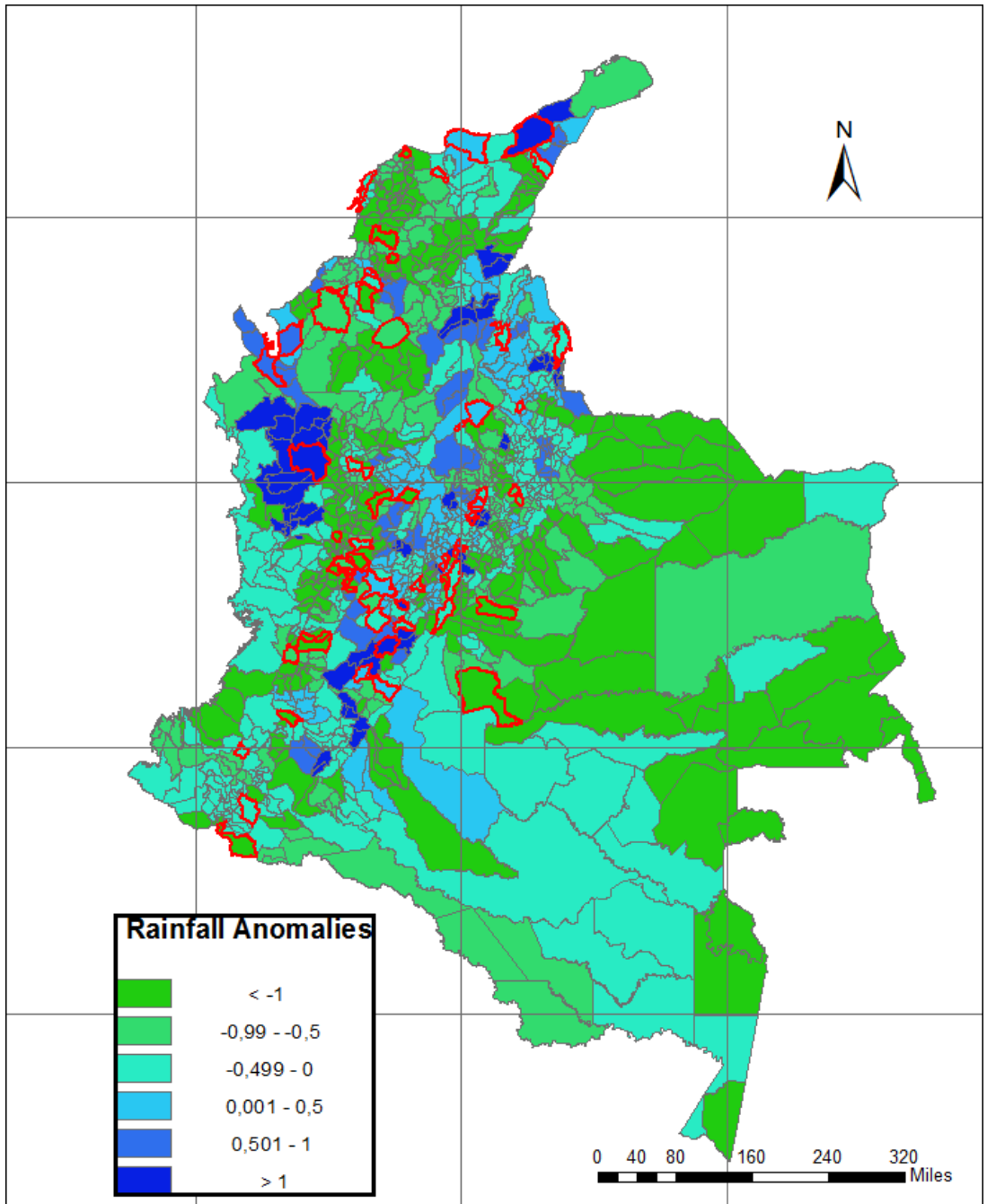
May 2012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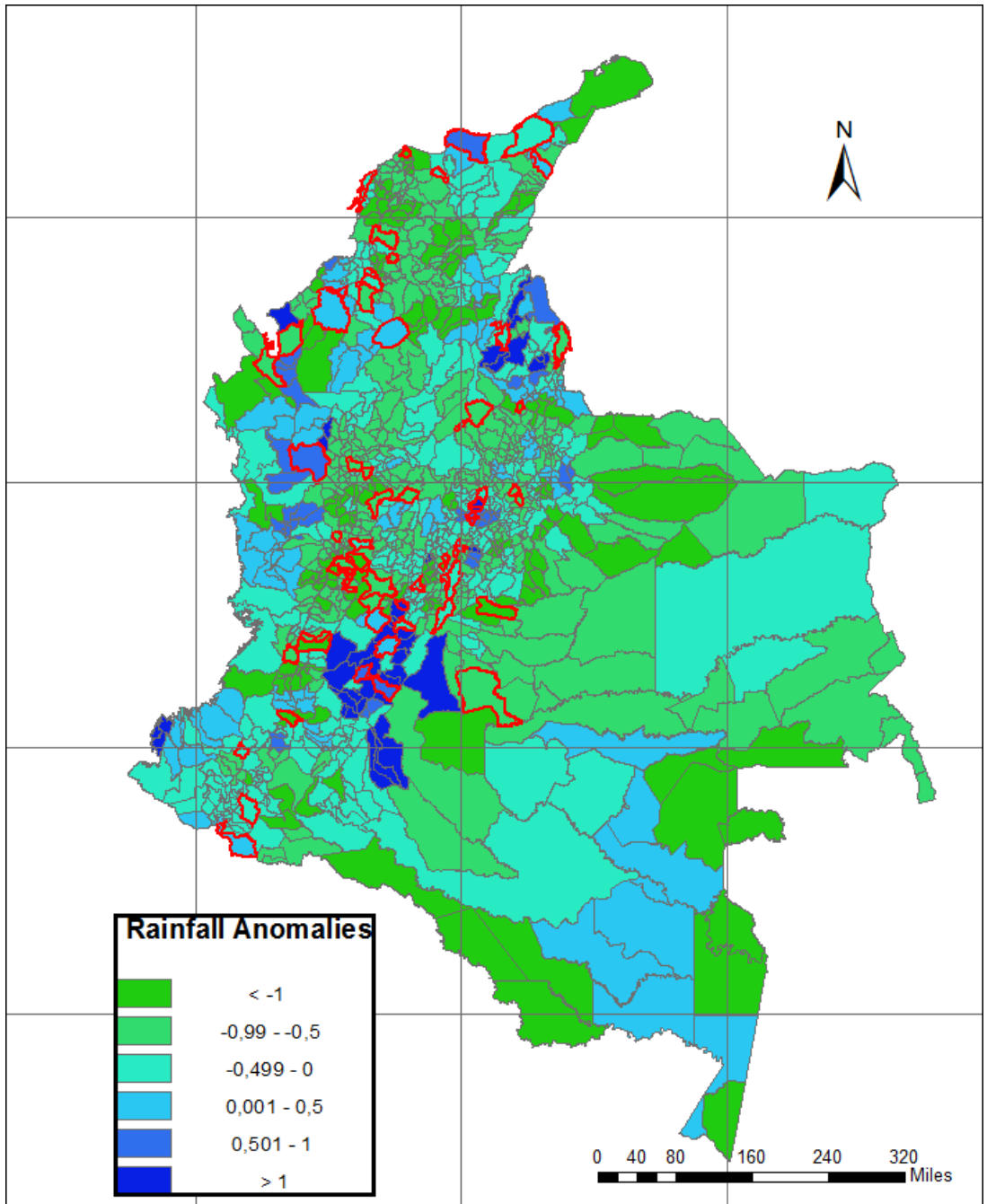
June 2012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Exposure period

- July 2010 - December 2011
- The worst winter in Colombian history in between two waves of panel data: The first round of the ELCA ended in june 2010, the second round started in 2013.

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Tab.: Descriptive Statistics

	mean	sd	N
In Utero	9.07	16.25	2692
Year 1	14.27	21.90	2692
Year 2	17.21	23.47	2692
Year 3	18.70	23.84	2692
Year 4	13.82	23.04	2692
Log birth weight	8.04	0.14	2487
Low birth weight	0.10	0.30	1860
Under-weight	0.04	0.20	2692
Stunted	0.11	0.31	2692
Socioemotional risk	0.21	0.40	2692
Socioemotional score	39.79	26.23	2692
Cognitive test score	102.34	19.93	4047
Vaccines	0.75	0.43	2652
Preschool	0.59	0.49	2377
Teach	0.32	0.47	2692
Read	0.16	0.37	2692
Play	0.96	0.20	2692
Meat	0.16	0.36	2380
Fruits or Veg	0.70	0.46	2381
Household size	5.26	2.45	2692
Age of head	40.35	12.52	2692
Over Poverty Line	0.42	0.49	2692
Secondary Education	0.28	0.45	2692
Social Capital	0.14	0.34	2692
Credit Access	0.56	0.50	2692
Distance to station (km)	6.34	3.54	2692

Tab.: Balance

	(1) Utero	(2) Year 1	(3) Year 2	(4) Year 3	(5) Year 4
Over Poverty Line	-0.33024	-0.35846	-0.30143	0.28667	0.16322
	(0.27494)	(0.30679)	(0.22170)	(0.43155)	(0.22267)
Secondary Education	0.42326	0.01750	-0.44250	-0.27121	-0.03353
	(0.30316)	(0.29870)	(0.49452)	(0.40222)	(0.30450)
Social Capital	0.39910	0.70372*	0.44672	0.07241	-0.32839
	(0.31523)	(0.38871)	(0.52393)	(0.52824)	(0.33952)
Credit Access	0.11844	0.35280	-0.01741	-0.37798	-0.15105
	(0.20363)	(0.38074)	(0.33877)	(0.26090)	(0.27752)
Distance to station (km)	0.01029	0.03976	0.00772	0.36382	0.37846*
	(0.13785)	(0.20333)	(0.21375)	(0.22605)	(0.20486)
Distance to station squared (km)	-0.00549	-0.00946	-0.00987	-0.02054	-0.02478**
	(0.00836)	(0.01305)	(0.01312)	(0.01318)	(0.01124)
Female Dummy	-0.14011	0.50437	0.26301	-0.37595	0.08694
	(0.22770)	(0.33836)	(0.25058)	(0.25625)	(0.21999)
Male adults	-0.09298	-0.08804	0.61288*	-0.34009	-0.46477
	(0.20069)	(0.38981)	(0.31187)	(0.45644)	(0.37798)
Female adults	-0.07628	-0.12502	0.78808**	-0.33574	-0.08773
	(0.22788)	(0.39996)	(0.35684)	(0.46305)	(0.39863)
Boys under 15	0.13599	-0.38788	0.55899	-0.16382	-0.23011
	(0.20600)	(0.41355)	(0.36663)	(0.47664)	(0.43460)
Girls under 15	0.01889	-0.17706	0.69525*	-0.20457	-0.10598
	(0.20950)	(0.32073)	(0.34912)	(0.50857)	(0.42860)
Household size	0.00808	0.18719	-0.63621**	0.23823	0.15620
	(0.17853)	(0.35016)	(0.31554)	(0.46152)	(0.40403)
Age of head	0.08876*	-0.02454	0.04698	0.03268	-0.01463
	(0.04632)	(0.08106)	(0.09310)	(0.06732)	(0.06501)
Age of head squared	-0.00126**	0.00019	-0.00047	-0.00040	0.00017
	(0.00055)	(0.00092)	(0.00103)	(0.00079)	(0.00078)
Observations	2842	2842	2842	2842	2842

Standard errors clustered at the municipality level in parenthesis. Cross-section regressions with month of birth dummies, cohort (age in months) dummies and municipality fixed effects.

Tab.: Checking for Selection

	(1) Household Migrated	(2) Head Changed	(3) Household Migrated or Head Changed	(4) Weighed at Birth	(5) Weighed at Birth
In Utero	-0.00077	-0.00081	-0.00184	-0.00226***	-0.00228***
	(0.00075)	(0.00093)	(0.00116)	(0.00070)	(0.00073)
Year 1	-0.00026	-0.00040	-0.00043	-0.00022	-0.00016
	(0.00041)	(0.00080)	(0.00092)	(0.00073)	(0.00077)
Year 2	0.00001	-0.00050	-0.00057	-0.00095	-0.00082
	(0.00053)	(0.00059)	(0.00075)	(0.00080)	(0.00081)
Year 3	0.00007	-0.00069	-0.00062	-0.00042	-0.00037
	(0.00046)	(0.00065)	(0.00075)	(0.00069)	(0.00069)
Year 4	0.00048	0.00012	0.00041	-0.00205*	-0.00209*
	(0.00061)	(0.00074)	(0.00090)	(0.00116)	(0.00119)
Damaged Infrastructure	No	No	No	No	Yes
Observations	3019	3271	3438	2396	2396

Standard errors clustered at the municipality level in parenthesis. Cross-section regressions with month of birth dummies, cohort (age in months) dummies and municipality fixed effects.

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Tab.: The effects of La Niña on human capital outcomes

	(1) Log Birthweight	(2) Low Birthweight	(3) Standardized Weight	(4) Standardized Height	(5) Socioemotional Score	(6) Socioemotional Risk	(7) Cognitive Test
In Utero	-0.00157***	0.00292***	-0.00481	-0.00167	0.17496***	0.00361**	
	(0.00055)	(0.00103)	(0.00369)	(0.00469)	(0.06486)	(0.00146)	
Year 1	-0.00030	-0.00015	-0.00234	0.00058	0.04517	0.00099	-0.07149
	(0.00045)	(0.00078)	(0.00247)	(0.00231)	(0.06390)	(0.00148)	(0.08818)
Year 2	-0.00047	-0.00030	-0.00005	0.00318	0.15838**	0.00271***	-0.10594**
	(0.00037)	(0.00084)	(0.00263)	(0.00246)	(0.06216)	(0.00102)	(0.04432)
Year 3	-0.00029	-0.00072	0.00209	0.00055	0.01952	-0.00048	0.01772
	(0.00033)	(0.00080)	(0.00282)	(0.00331)	(0.06637)	(0.00108)	(0.03810)
Year 4	-0.00055	-0.00062	-0.00035	0.00455	0.10852	0.00186*	-0.02532
	(0.00055)	(0.00098)	(0.00370)	(0.00343)	(0.07292)	(0.00109)	(0.04618)
Upper Bound	-0.00107 ***	0.00266***					
	(0.00022)	(0.00096)					
Lower Bound	-0.00220 ***	0.00451***					
	(0.00057)	(0.00119)					
Observations	1972	1972	2831	2824	2692	2692	4047
P-Value U=Y1=Y2=Y3=Y4	0.30	0.02					
P-Value Y1=Y2=Y3=Y4=0	0.97	0.94					
P-Value Y1=Y2=Y3=Y4					0.24	0.18	0.14
P-Value Y1=Y3=Y4=0					0.51	0.37	0.63

Standard errors clustered at the municipality level in parenthesis. Cross-section regressions with month of birth dummies, cohort (age in months) dummies and municipality fixed effects. Controls not shown are predetermined variables: gender, number of persons in the household, number of male adults, number of female adults, male children under age 15, female children under age 15, age of the head, age of the head squared and distance to the closest weather station in levels and squared.

Magnitudes: birth-weight:0.19sd, socioemotional: utero = 0.15sd , 2nd year = 0.17sd, cognitive:0.11sd

▸ gestation ▸ controls ▸ interactions ▸ selfr ▸ questions ▸ disasters ▸ infrastructure ▸ diseases

Summarizing results so far

1. Findings are consistent with the economic interpretation of the fetal origins hypothesis : As many others we find that shocks in utero reduce birthweight.
2. We do not find significant effects for weight and height of in utero exposure but signs are as expected.
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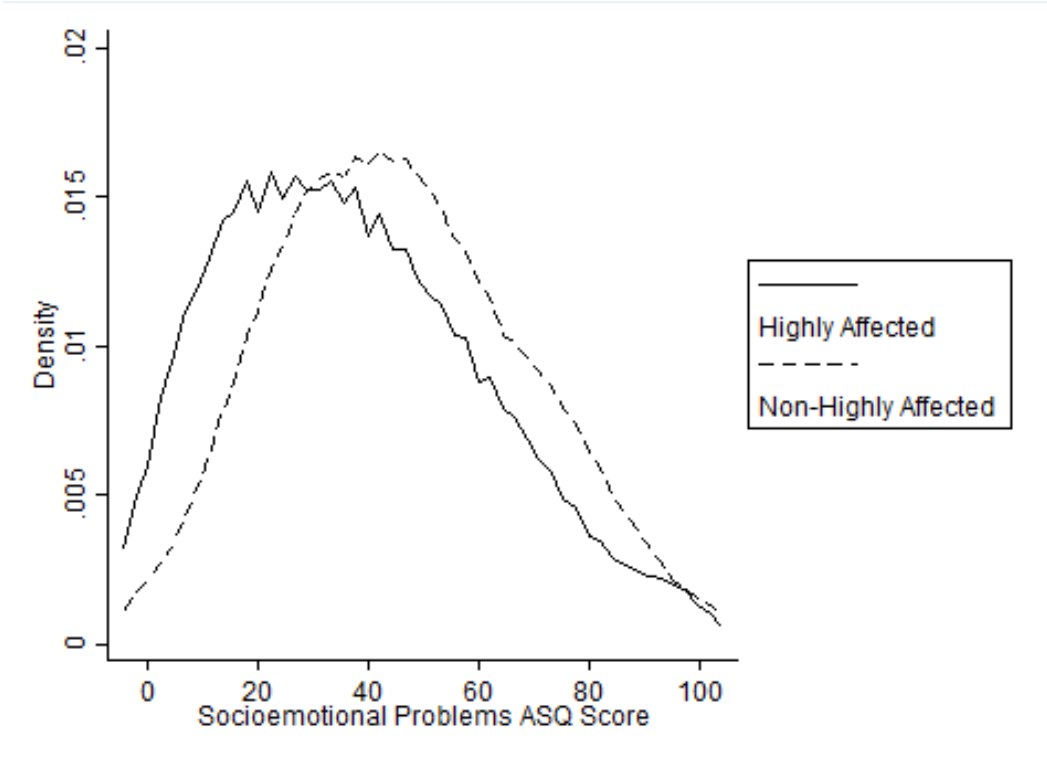

Figure: Socio-emotional problems score and exposure to La Niña in the second year of life

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- The second year of life finding is consistent with findings of early life interventions.
- The Jamaica experiment (Gertler et al (2014)) targeted children age 9 to 25 month. Mental stimulation but not nutrition affected adult outcomes.
- The Colombia experiment (Attanasio et al (2014,2015)) targeted children ages 12 to 24 months: The mental stimulation arm increased cognitive and socio-emotional development while the micro-nutrient arm did not affect any outcome.
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- Between 13 and 24 months of age, the children brain is more responsive to socio-emotional stimulation.
- During the second year of life the plasticity of the brain is highest in term of language and symbol development, habitual ways of responding and emotional control (Council for Early Child Development, 2010)

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▸ brain

Tab.: La Niña and Socioemotional Effects.

	(1) Score	(2) Self Regulation	(3) Compliance	(4) Communication	(5) Adaptative Functioning	(6) Autonomy	(7) Affect	(8) Interaction
In Utero	0.17496***	0.06654	-0.01092	0.00097	0.05218**	-0.00430	0.03499**	0.01349
	(0.06486)	(0.04211)	(0.01807)	(0.01360)	(0.02312)	(0.02484)	(0.01430)	(0.01999)
Year 1	0.04517	0.04522	-0.01403	-0.02001	0.01813	0.01751	0.00232	-0.02166
	(0.06390)	(0.03481)	(0.01594)	(0.01258)	(0.01709)	(0.01700)	(0.00860)	(0.01819)
Year 2	0.15838**	0.06803*	0.01165	0.00842	0.02337*	-0.00451	0.01031	0.03097
	(0.06216)	(0.03777)	(0.01185)	(0.01267)	(0.01306)	(0.01767)	(0.00934)	(0.01942)
Year 3	0.01952	0.01457	-0.00034	-0.01857*	0.02264*	-0.00838	0.01010	-0.00745
	(0.06637)	(0.03064)	(0.01492)	(0.01023)	(0.01256)	(0.01723)	(0.01210)	(0.01938)
Year 4	0.10852	0.05246	-0.01076	0.00090	0.01766	0.00692	0.01050	0.02780*
	(0.07292)	(0.04552)	(0.02021)	(0.01038)	(0.01876)	(0.01829)	(0.01141)	(0.01455)
Observations	2692	2689	2364	2690	2689	2364	2691	2689

Standard errors clustered at the municipality level in parenthesis. Cross-section regressions with month of birth dummies, cohort (age in months) dummies and municipality fixed effects. Controls not shown are predetermined variables: gender, number of persons in the household, number of male adults, number of female adults, male children under age 15, female children under age 15, age of the head, age of the head squared and distance to the closest weather station.

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Consumption Smoothing

- Following Aldermand and Paxson (1992) and Kazianga and Udry (2006) we estimate consumption functions as in,

$$\triangle c_{hmt} = \alpha_1 x_{hm2010} + \alpha_2 Exp_h + \gamma_m + \mu_{hmt} \quad (2)$$

- Where $\triangle c_{hmt}$ is the change in consumption expenditures of household h, in municipality m and year t.
- Exp_h is the number of days during la Niña that a household experiences rainfall shocks.
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Consumption Smoothing

Tab.: La Niña and Consumption Smoothing.

	(1) Hhd-Level Shock	(2) Consumption Expenditures	(3) Consumption Expenditures Restricted Sample I	(4) Consumption Expenditures Restricted Sample II
Days with Extreme Rain		-386.7**	-1284.3*	-891.4
		(190.4)	(721.3)	(1019.2)
Male adults	-0.195	5299.9	17898.3	15097.0
	(0.244)	(4521.9)	(11228.1)	(9462.8)
Female adults	-0.386*	7118.2	14754.7	1100.6
	(0.217)	(4724.7)	(13282.2)	(13410.7)
Boys under 15	-0.241	-2512.4	27498.2**	29811.7***
	(0.239)	(4923.8)	(12082.7)	(10437.0)
Girls under 15	-0.140	-2737.0	24764.7**	30785.7**
	(0.250)	(5281.9)	(10782.7)	(12368.3)
Household size	0.183	-5300.5	-15886.3	-11942.3
	(0.214)	(5236.4)	(11818.6)	(8986.6)
Age of head	-0.0790	1549.2	183.3	553.0
	(0.0587)	(1288.3)	(1787.5)	(2124.6)
Age of head squared	0.000807	-20.61	-12.98	-11.48
	(0.000615)	(13.85)	(23.72)	(22.29)
Distance to station	1.053**	-2975.5	-3841.9	-3509.1
	(0.507)	(3179.8)	(3638.8)	(4524.3)
Distance to Station Squared	-0.0940***	156.8	169.9	192.8
	(0.0299)	(209.9)	(200.6)	(241.8)
Over Poverty	-0.296	-86617.4***	-93838.5***	-102537.8***
	(0.299)	(9114.5)	(10190.5)	(15949.5)
Secondary Education	-0.119	22885.7***	24299.6***	32503.7**
	(0.267)	(7359.2)	(8566.2)	(13225.3)
Social Capital	1.022	4847.7	-995.4	-2229.7
	(0.647)	(5397.0)	(6789.0)	(12497.6)
Household had debt	-0.164	5230.3	-12199.9	-14984.9
	(0.172)	(4159.7)	(7520.0)	(11540.3)
Observations	7757	7686	2142	955

Standard errors clustered at the municipality level in parenthesis. Cross section regressions of changes in household conumption between 2010 and 2013 against the number of days that the household was exposed to La Niña(Exp_h). Municipality fixed effects are included.

1 Motivation

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Family responses

- Shock in the second year of life (and in utero) hurt human capital.
- Today (6 to 36 months after the shocks) are families investing more or less in kids who receive shocks during the second year of life?

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Family Responses

Tab.: Investment Responses.

	(1) Vaccines	(2) Preschool	(3) Teach	(4) Read	(5) Play	(6) Meat	(7) Milk	(8) Fruits or Veg.
In Utero	0.00151	0.00179	0.00060	0.00174	-0.00137**	0.00058	0.00119	-0.00117
	(0.00126)	(0.00231)	(0.00185)	(0.00154)	(0.00059)	(0.00140)	(0.00158)	(0.00165)
Year 2	0.00046	-0.00316**	-0.00220**	0.00021	-0.00064	-0.00100	-0.00059	-0.00072
	(0.00110)	(0.00151)	(0.00090)	(0.00088)	(0.00042)	(0.00081)	(0.00086)	(0.00103)
Observations	2401	1550	2443	2443	2443	2442	1781	2443

Standard errors clustered at the municipality level in parenthesis. Cross-section regressions with month of birth dummies, cohort (age in months) dummies and municipality fixed effects. Controls not shown are predetermined variables: gender, number of persons in the household, number of male adults, number of female adults, male children under age 15, female children under age 15, age of the head, age of the head squared and distance to the closest weather station in levels and squared.

Family Responses

Tab.: Investment Responses.

	(1) Vaccines	(2) Preschool	(3) Teach	(4) Read	(5) Play	(6) Meat	(7) Milk	(8) Fruits or Veg.
In Utero	0.00132	0.00265	0.00084	0.00193	-0.00148**	0.00110	0.00175	-0.00120
	(0.00126)	(0.00199)	(0.00179)	(0.00167)	(0.00058)	(0.00128)	(0.00150)	(0.00169)
Year 2	0.00019	-0.00311**	-0.00237**	-0.00013	-0.00064	-0.00094	-0.00049	-0.00057
	(0.00108)	(0.00152)	(0.00109)	(0.00084)	(0.00046)	(0.00084)	(0.00085)	(0.00110)
Change in per capita consumption	-0.00073	0.02939***	0.00592	0.01268	0.00048	0.01422*	0.02566***	0.00929*
	(0.00571)	(0.00558)	(0.00684)	(0.00833)	(0.00358)	(0.00762)	(0.00858)	(0.00542)
Observations	2392	1542	2433	2433	2433	2432	1772	2433

Standard errors clustered at the municipality level in parenthesis. Cross-section regressions with month of birth dummies, cohort (age in months) dummies and municipality fixed effects. Controls not shown are predetermined variables: gender, number of persons in the household, number of male adults, number of female adults, male children under age 15, female children under age 15, age of the head, age of the head squared and distance to the closest weather station in levels and squared.

Family responses

- Parents seem to reinforce shocks during the second year of life: parent are less likely to send kids to school and less likely to invest time teaching them.

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- Critical period por health (birth-weight): The gestation period.
- Critical period for cognitive and socioemotional skills: The second year of life.
- Families could not balance consumption.
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Tab.: Correlation of Exposure measures

	(1)				
	utero	y1	y2	y3	y4
utero	1				
y1	0.334	1			
y2	-0.376	0.240	1		
y3	-0.443	-0.463	0.146	1	
y4	-0.336	-0.382	-0.385	0.336	1

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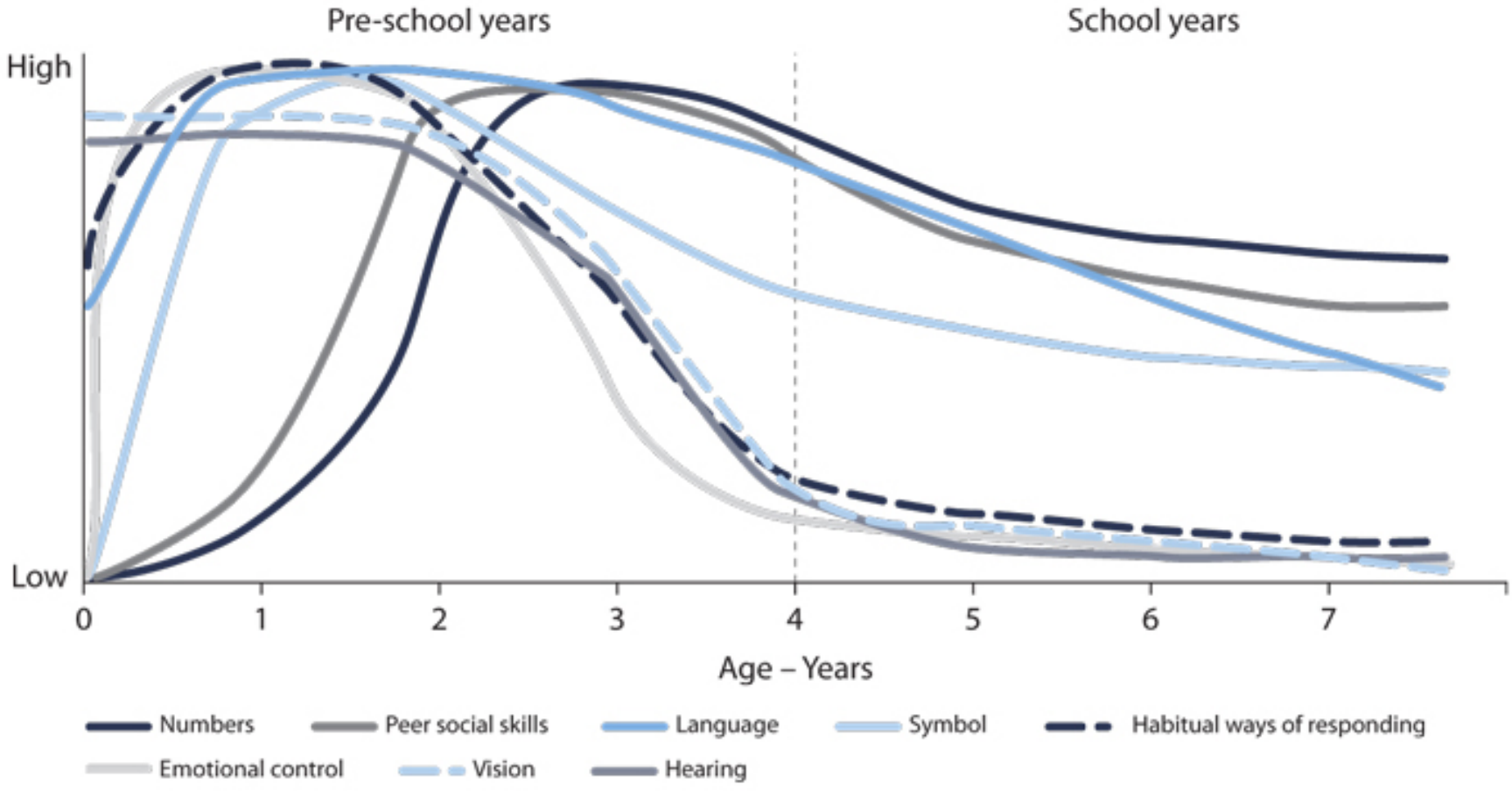

Figure: Sensitive Periods in Early Brain Development. Source: Council for Early Child Development

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Gestation Period

Tab.: La Niña and Human Capital Outcomes. Trimesters.

	(1) Log Birthweight	(2) Low Birthweight	(3) Standardized Weight	(4) Standardized Height	(5) Socioemotional Score	(6) Socioemotional Risk
Trimester 1	-0.00157	0.00501**	-0.00571	-0.00567	0.16298	0.00291
	(0.00113)	(0.00250)	(0.00792)	(0.00776)	(0.10982)	(0.00243)
Trimester 2	-0.00303***	0.00596**	-0.00594	-0.00006	0.01115	0.00362
	(0.00097)	(0.00263)	(0.00640)	(0.00847)	(0.12976)	(0.00287)
Trimester 3	0.00029	-0.00330	-0.00252	0.00068	0.38499***	0.00485**
	(0.00101)	(0.00247)	(0.00681)	(0.00656)	(0.12465)	(0.00228)
Year 1	-0.00039	0.00027	-0.00249	0.00025	0.03348	0.00090
	(0.00046)	(0.00084)	(0.00256)	(0.00244)	(0.06675)	(0.00150)
Year 2	-0.00048	-0.00033	-0.00004	0.00329	0.15714**	0.00296***
	(0.00037)	(0.00085)	(0.00259)	(0.00249)	(0.06220)	(0.00106)
Year 3	-0.00032	-0.00060	0.00205	0.00049	0.01629	-0.00060
	(0.00033)	(0.00083)	(0.00285)	(0.00335)	(0.06666)	(0.00106)
Year 4	-0.00055	-0.00059	-0.00036	0.00454	0.10721	0.00221*
	(0.00055)	(0.00098)	(0.00371)	(0.00345)	(0.07282)	(0.00114)
Observations	1972	1972	2831	2824	2692	2730

Standard errors clustered at the municipality level in parenthesis. Cross-section regressions with month of birth dummies, cohort (age in months) dummies and municipality fixed effects. Controls not shown are pre-determined variables: gender, number of persons in the household, number of male adults, number of female adults, male children under age 15, female children under age 15, age of the head, age of the head squared and distance to the closest weather station in levels and squared.

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Self-reports

Tab.: La Niña and Human Capital Outcomes. Dropping kids in families who self-report being affected.

	(1) Log Birthweight	(2) Low Birthweight	(3) Socioemotional Score	(4) Socioemotional Risk	(5) Cognitive Test
In Utero	-0.00117**	0.00226**	0.18002**	0.00347**	
	(0.00055)	(0.00111)	(0.07525)	(0.00168)	
Year 1	-0.00065	0.00062	0.01885	0.00114	-0.06985
	(0.00047)	(0.00092)	(0.07295)	(0.00158)	(0.09957)
Year 2	-0.00035	0.00006	0.12841*	0.00249**	-0.11959**
	(0.00046)	(0.00090)	(0.06904)	(0.00121)	(0.05845)
Year 3	-0.00041	-0.00068	-0.03676	-0.00089	0.02363
	(0.00041)	(0.00104)	(0.06964)	(0.00114)	(0.04641)
Year 4	-0.00046	-0.00017	0.11201	0.00248**	-0.05260
	(0.00069)	(0.00110)	(0.07874)	(0.00121)	(0.05076)
Observations	1721	1721	2314	2314	3380

Standard errors clustered at the municipality level in parenthesis. Cross-section regressions with month of birth dummies, cohort (age in months) dummies and municipality fixed effects. Controls not shown are predetermined variables: gender, number of persons in the household, number of male adults, number of female adults, male children under age 15, female children under age 15, age of the head, age of the head squared and distance to the closest weather station in levels and squared.

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Human Capital Outcomes with predetermined controls

Tab.: La Niña and Human Capital Outcomes. Additional controls.

	(1) Log Birthweight	(2) Low Birthweight	(3) Socioemotional Score	(4) Socioemotional Score Restricted Sample	(5) Socioemotional risk	(6) Socioemotional Risk Restricted Sample	(7) Cognitive Test	(8) Cognitive Test Restricted Sample
In Utero	-0.00126**	0.00329***	0.13471**		0.00320**			
	(0.00056)	(0.00099)	(0.06046)		(0.00137)			
Year 2			0.11733**	0.08241	0.00209**	0.00200*	-0.10055**	-0.09100*
			(0.05553)	(0.06099)	(0.00097)	(0.00102)	(0.04260)	(0.05266)
Over Poverty Line	0.01573**	-0.01976	-1.93115	-2.77209	-0.02122	-0.02988	2.71870***	2.83675***
	(0.00663)	(0.01360)	(1.24225)	(1.72184)	(0.01679)	(0.02036)	(0.66570)	(1.05333)
Secondary Education	0.00728	-0.00458	-3.13811***	-3.23317**	-0.05039***	-0.04256*	8.03961***	8.60892***
	(0.00726)	(0.01598)	(0.98243)	(1.43180)	(0.01647)	(0.02345)	(1.11403)	(1.15064)
Social Capital	0.00683	-0.00800	-0.64832	-1.63153	-0.00732	-0.00432	2.08535*	2.84263**
	(0.00982)	(0.02116)	(1.30575)	(1.56408)	(0.02040)	(0.02797)	(1.04946)	(1.36823)
Credit Access	-0.00284	0.00711	-0.55199	-0.99829	-0.00147	-0.02179	2.53837***	2.61047***
	(0.00716)	(0.01573)	(1.21761)	(1.59096)	(0.02009)	(0.02893)	(0.58395)	(0.78341)
Observations	1972	1972	2692	1655	2692	1655	4047	1655

Standard errors clustered at the municipality level in parenthesis. Cross-section regressions with month of birth dummies, cohort (age in months) dummies and municipality fixed effects. Controls not shown are predetermined variables: gender, number of persons in the household, number of male adults, number of female adults, male children under age 15, female children under age 15, age of the head, age of the head squared and distance to the closest weather station in levels and squared.

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Interactions

Tab.: La Niña, parental characteristis and Human Capital Outcomes.

	(1) Log Birthweight	(2) Low Birthweight	(3) Socioemotional Score	(4) Socioemotional Risk	(5) Cognitive Test
In Utero	-0.00113**	0.00258**	0.15909**	0.00434***	
	(0.00050)	(0.00105)	(0.07174)	(0.00149)	
Utero X Over Poverty	-0.00043	0.00139	-0.03791	-0.00159	
	(0.00037)	(0.00095)	(0.05966)	(0.00100)	
Utero X Secondary Education	-0.00042	-0.00075	0.07719*	0.00104	
	(0.00046)	(0.00105)	(0.04546)	(0.00114)	
Utero X Urban	0.00041	0.00048	-0.06743	-0.00174	
	(0.00043)	(0.00081)	(0.04633)	(0.00109)	
Year 2			0.12111*	0.00205*	-0.07900*
			(0.06470)	(0.00104)	(0.04287)
Year 2 X Over Poverty			-0.02400	-0.00050	-0.04609*
			(0.05303)	(0.00084)	(0.02385)
Year 2 X Secondary Education			0.01182	0.00000	0.02402
			(0.04907)	(0.00090)	(0.03809)
Year 2 X Urban			0.00250	0.00046	-0.02141
			(0.05416)	(0.00085)	(0.02806)
Observations	1972	1972	2692	2692	4047

Standard errors clustered at the municipality level in parenthesis. Cross-section regressions with month of birth dummies, cohort (age in months) dummies and municipality fixed effects. Controls not shown are pre-determined variables: gender, number of persons in the household, number of male adults, number of female adults, male children under age 15, female children under age 15, age of the head, age of the head squared and distance to the closest weather station in levels and squared.

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Realized Disasters

Tab.: La Niña, parental characteristis and Human Capital Outcomes. Disasters as competing controls.

	(1) Log Birthweight	(2) Low Birthweight	(3) Socioemotional Score	(4) Socioemotional Risk	(5) Cognitive Test
In Utero	-0.00169***	0.00302***	0.19278***	0.00399**	
	(0.00049)	(0.00100)	(0.07115)	(0.00158)	
Year 1	-0.00011	-0.00047	0.04664	0.00091	-0.04504
	(0.00044)	(0.00084)	(0.05208)	(0.00136)	(0.09275)
Year 2	-0.00057	-0.00003	0.14486**	0.00260**	-0.11119**
	(0.00035)	(0.00080)	(0.06042)	(0.00103)	(0.04706)
Year 3	-0.00016	-0.00083	0.01556	-0.00056	0.00694
	(0.00038)	(0.00086)	(0.06717)	(0.00104)	(0.03882)
Year 4	-0.00045	-0.00081	0.12163*	0.00221**	-0.03257
	(0.00055)	(0.00097)	(0.06994)	(0.00111)	(0.04323)
Disasters utero	0.00031	0.00111	-0.20930	-0.00406	
	(0.00086)	(0.00178)	(0.45651)	(0.00902)	
Disasters Year 1	-0.00182***	0.00259**	-0.15092	-0.00127	
	(0.00052)	(0.00121)	(0.16870)	(0.00181)	
Disasters Year 2	-0.00001	0.00060	0.13420	0.00336	
	(0.00046)	(0.00124)	(0.15913)	(0.00205)	
Disasters Year 3	-0.00092	0.00126	-0.11642	-0.00054	
	(0.00058)	(0.00144)	(0.11171)	(0.00151)	
Disasters Year 4	-0.00053	0.00254**	0.03773	0.00247	
	(0.00055)	(0.00124)	(0.19295)	(0.00204)	
Observations	2000	2000	2730	2730	4097

Standard errors clustered at the municipality level in parenthesis. Cross-section regressions with month of birth dummies, cohort (age in months) dummies and municipality fixed effects. Controls not shown are predetermined variables: gender, number of persons in the household, number of male adults, number of female adults, male children under age 15, female children under age 15, age of the head, age of the head squared and distance to the closest weather station in levels and squared.

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Infrastructure Destruction

Tab.: La Niña, parental characteristics and Human Capital Outcomes. Destruction of Infrastructure as competing control.

	(1) Log Birthweight	(2) Low Birthweight	(3) Socioemotional Score	(4) Socioemotional Risk	(5) Cognitive Test
In Utero	-0.00152***	0.00288***	0.17877***	0.00376**	
	(0.00055)	(0.00103)	(0.06461)	(0.00147)	
Year 1	-0.00025	-0.00025	0.04232	0.00099	-0.04504
	(0.00044)	(0.00078)	(0.06196)	(0.00146)	(0.09275)
Year 2	-0.00060	0.00001	0.16304**	0.00295***	-0.11119**
	(0.00037)	(0.00082)	(0.06295)	(0.00105)	(0.04706)
Year 3	-0.00020	-0.00087	0.00816	-0.00058	0.00694
	(0.00033)	(0.00080)	(0.06502)	(0.00105)	(0.03882)
Year 4	-0.00053	-0.00056	0.11461	0.00222*	-0.03257
	(0.00055)	(0.00097)	(0.07448)	(0.00114)	(0.04323)
Observations	2000	2000	2730	2730	4097

Standard errors clustered at the municipality level in parenthesis. Cross-section regressions with month of birth dummies, cohort (age in months) dummies and municipality fixed effects. Controls not shown are predetermined variables: gender, number of persons in the household, number of male adults, number of female adults, male children under age 15, female children under age 15, age of the head, age of the head squared and distance to the closest weather station in levels and squared.

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Disease Environment

Tab.: La Niña, parental characteristics and Human Capital Outcomes. Diseases as competing controls.

	(1) Log Birthweight	(2) Low Birthweight	(3) Socioemotional Score	(4) Socioemotional Risk	(5) Cognitive Test
In Utero	-0.00168***	0.00329***	0.18182***	0.00375**	
	(0.00057)	(0.00106)	(0.06473)	(0.00145)	
Year 1	-0.00028	-0.00041	0.03479	0.00113	0.01710
	(0.00048)	(0.00084)	(0.06259)	(0.00148)	(0.09566)
Year 2	-0.00051	0.00016	0.15695**	0.00256**	-0.11546**
	(0.00037)	(0.00085)	(0.06272)	(0.00103)	(0.04998)
Year 3	-0.00006	-0.00085	0.00126	-0.00075	0.00925
	(0.00034)	(0.00077)	(0.06798)	(0.00117)	(0.03976)
Year 4	-0.00042	-0.00100	0.11828	0.00258**	-0.03663
	(0.00058)	(0.00107)	(0.07313)	(0.00117)	(0.04427)
Diseases utero	-0.00009	0.00002	-0.01031	-0.00024	
	(0.00010)	(0.00023)	(0.01117)	(0.00022)	
Diseases Y1	-0.00007	0.00016	0.00044	0.00033	-0.01796*
	(0.00010)	(0.00021)	(0.01110)	(0.00021)	(0.01001)
Diseases Y2	-0.00002	-0.00007	-0.01367	0.00001	0.00385
	(0.00007)	(0.00014)	(0.01417)	(0.00025)	(0.00908)
Diseases Y3	-0.00002	-0.00000	-0.00234	-0.00008	-0.00627
	(0.00009)	(0.00020)	(0.01425)	(0.00023)	(0.01028)
Diseases Y4	0.00008	0.00006	-0.01864	-0.00014	-0.01375**
	(0.00009)	(0.00017)	(0.01326)	(0.00018)	(0.00637)
Observations	2000	2000	2730	2730	4097

Standard errors clustered at the municipality level in parenthesis. Cross-section regressions with month of birth dummies, cohort (age in months) dummies and municipality fixed effects. Controls not shown are predetermined variables: gender, number of persons in the household, number of male adults, number of female adults, male children under age 15, female children under age 15, age of the head, age of the head squared and distance to the closest weather station in levels and squared.

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Parental Responses

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Tab.: Investment Responses with change in consumption as bad control.

	(1) Vaccines	(2) Preschool	(3) Teach	(4) Interacts	(5) Meat	(6) Fruits and Veg.	(7) Milk
In Utero	0.00045	0.00264	0.00091	-0.00114	-0.00026	-0.00131	-0.00325*
	(0.00155)	(0.00215)	(0.00140)	(0.00085)	(0.00247)	(0.00167)	(0.00169)
Year 1	0.00065	-0.00026	-0.00049	0.00103*	-0.00018	-0.00093	-0.00224*
	(0.00141)	(0.00181)	(0.00162)	(0.00059)	(0.00156)	(0.00117)	(0.00129)
Year 2	0.00076	-0.00267	-0.00202*	-0.00019	-0.00051	-0.00229*	-0.00319*
	(0.00140)	(0.00180)	(0.00119)	(0.00058)	(0.00145)	(0.00116)	(0.00182)
Year 3	-0.00008	-0.00334*	-0.00002	0.00012	-0.00026	-0.00190	-0.00138
	(0.00130)	(0.00172)	(0.00117)	(0.00061)	(0.00148)	(0.00134)	(0.00144)
Year 4	0.00054	0.00146	-0.00044	0.00109*	0.00228	-0.00039	-0.00226
	(0.00155)	(0.00107)	(0.00145)	(0.00058)	(0.00180)	(0.00151)	(0.00190)
Change in consumption	0.00010	0.02596***	0.00156	0.00106	0.02012***	0.00282	0.01720**
	(0.00508)	(0.00576)	(0.00522)	(0.00324)	(0.00555)	(0.00354)	(0.00696)
Observations	2768	1774	2815	2815	2423	2815	1764

Standard errors clustered at the municipality level in parenthesis. Cross-section regressions with month of birth dummies, cohort (age in months) dummies and municipality fixed effects. Controls not shown are predetermined variables: gender, number of persons in the household, number of male adults, number of female adults, male children under age 15, female children under age 15, age of the head, age of the head squared and distance to the closest weather station in levels and squared.

Questions ELCA 2013

- In the last three years, was your dwelling affected by floods? How many times? Month and year of most extreme flood.
- Events which destabilized the household in last three years (floods and other disasters). Economic importance (low, medium, high). If high or medium importance: say Month and year.

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