Landmines and Spatial Development
Appendix VI
Sensitivity Analysis, Local Effects *

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Abstract

This Appendix presents various sensitivity checks and graphical illustrations of the within-locality association between regional development-urbanization and landmine clearance.

*Additional material can be found at www.land-mines.com

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Sensitivity Analysis - Local Consequences of Demining

We have performed a plethora of sensitivity checks to assess the robustness of the within-locality association between development and demining. We have also looked at alternative-to-luminosity outcome variables to better understand the impact of demining. Before going over the sensitivity analysis, we present some visualizations of the within-locality association between luminosity and landmine clearance.

1 Graphical Illustration. Landmine Clearance and Local Development

It is useful to plot the evolution of luminosity around the year of full clearance, as this provides a visualization of the local estimates. Below we present four figures tracing log luminosity (Figures 1*a* and 2*a*) and the probability that the locality is lit (Figures 1*b* and 2*b*) around the timing of full clearance ($year = 0$). We partial out locality-specific constants (fixed-effects) and province-specific year fixed effects and then plot the residuals of luminosity in the 10 years before and 10 years after each locality's full clearance from contamination. The dashed horizontal lines give the mean values of demeaned luminosity before and after full clearance. Before discussing the graphs, a few caveats are in order. First, given the presence of positive spillovers, these "control"-"treatment" before-after graphs just illustrate local effects assuming no externalities. Second, there is noise in the exact date of recording of interventions, a concern that is non-negligible for demining activities before 2001 and before 2007.

The two Panels in Figure 1 illustrate the before and after full clearance evolution of luminosity across all contaminated localities. Figure 2 plot the demeaned luminosity before and after clearance looking across localities with more than one confirmed hazardous area (CHA), as this allows examining the evolution of luminosity for localities with a non-trivial degree of contamination.

The pattern is similar across all Figures: upon full clearance luminosity increases and remains higher throughout the post-demining period. The influence of demining is long lasting. One more pattern that is evident across Figures is that luminosity appears to start increasing one-to-three years before complete clearance, as demining operators are clearing more and more of the underlying contamination. This is to be expected as the duration of demining operations for the median locality was roughly 6 years whereas for those with more than one CHA the median duration was 8 years.

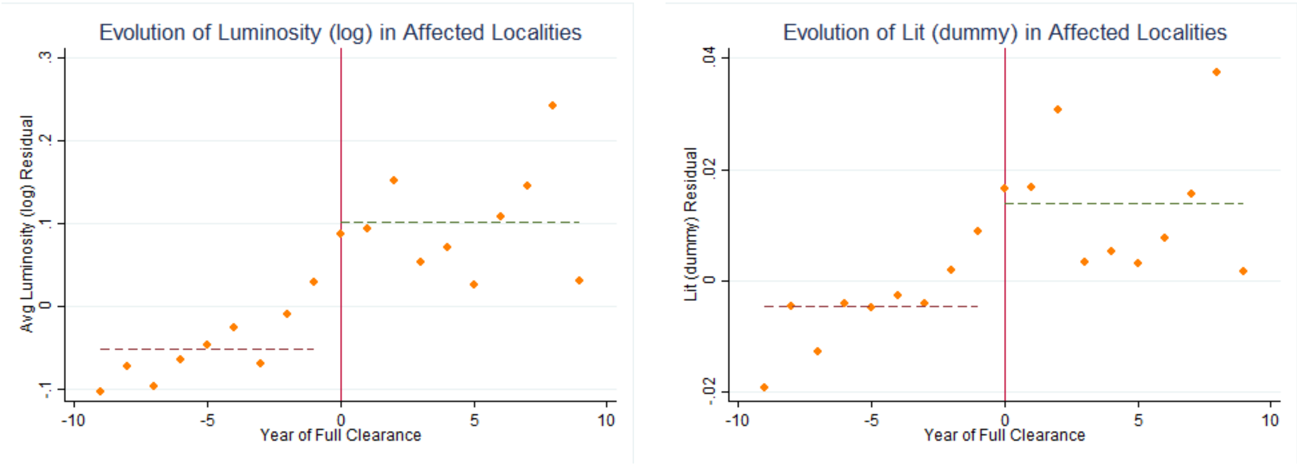

Figure 1: **Evolution of Luminosity before and after Last Year of Intervention.**

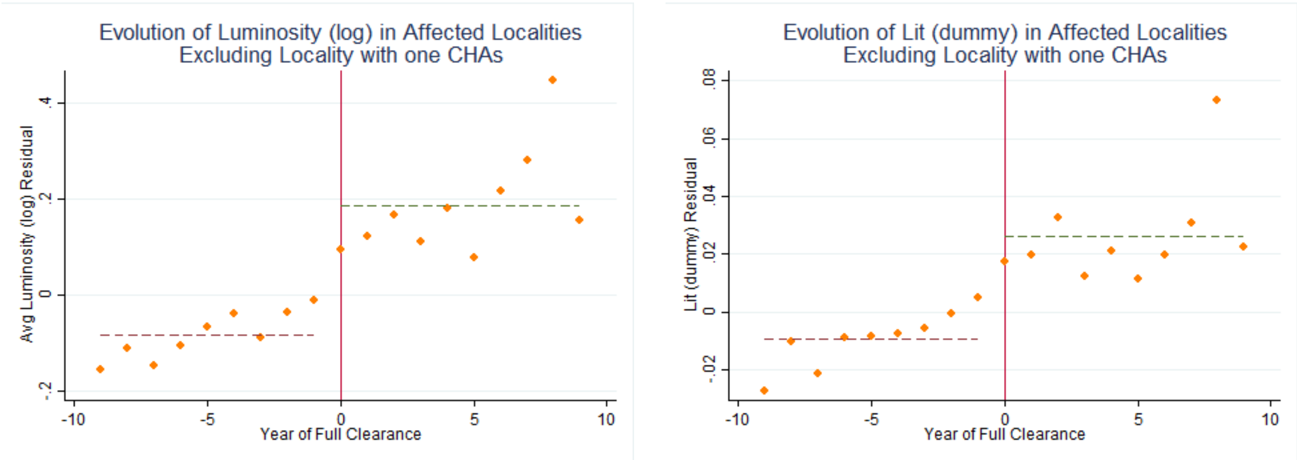

Figure 2: **Evolution of Luminosity before and after Last Year of Intervention. Excluding Localities (162) with only one Confirmed Hazardous Area.**

2 Alternative Outcomes

2.1 Population

During the civil war, there were widespread population movements both as a result of violence and because of landmine contamination. At the same time, both the FRELIMO government and RENAMO moved peasants to "development villages" and labor camps, respectively (see the historical overview in Appendix I). Unfortunately, locality-level data on population and casualties at the end of the civil war in 1992 are not available, so cleanly estimating the impact of demining on repatriation is not feasible. One way to gauge the degree of population reshuffling is to look at the evolution of population between the pre and post-civil war censuses. The correlation of log population at the locality level between 1980, the first post-independence Census, and 1997, the first-post-civil war census, is 0.59 suggesting significant changes in the population distribution during this 17-year period. Perhaps, what is more telling is the fact that the correlation of log population between the pre and post-civil war period strengthens across localities as time elapses; the correlation becomes 0.66 between log population in 1980 and in 2007. This suggests that the spatial distribution of population gradually returns to the one observed during the pre-civil war era.

Among the goals of demining interventions particularly during the early years, was to facilitate the return of the internally and externally displaced people. There were more than 1.5 million refugees mostly in Malawi and Zimbabwe, but also in Swaziland and Tanzania. And there were more than 2 million internally-displaced people, residing at dire conditions either in the big cities or in camps or in border areas. We used information on local population for 1980 and 2007 and explore whether reducing the degree of mine contamination in a given locality (or eliminating it altogether) influences the number of people living in that locality. We recognize that changes over time in the number of people reflects both internally displaced people and refugees in border areas returning to their homes (this is in line with United Nations action and both HALO Trust and NPAs action on the Malawian border) as well as differences in net fertility rates.

We attempt to capture the relationship between population movements and demining activities by estimating long-run-difference specifications over the $1980 - 2007$ period. Unfortunately, we are constrained to use 2007 as the terminal year, because the national statistical agency has not processes the 2017 census data, yet. Table 1 gives the results. The unconditional specification in column (1) reveals a significantly positive association between the log of cleared CHAs (Confirmed Hazardous Areas) and population growth. The coefficient retains its economic and statistical significance when we condition on various pre-civil-war features (paved, unpaved roads, the presence of cantinas) as well as population and luminosity (in columns (3) and (5)). The same pattern is detected with the cleared dummy that identifies fully cleared by landmines and UXOs localities, but the estimate on the indicator variable is noisy and does not pass standard significance levels. This applies both in the unconditional specification (in column (2)) and when we control for pre-clearance factors (in columns (4) and (6)). This might be because by 2007, only 48% of the contaminated localities were fully cleared, as well as the possibility that displaced individuals would start coming back home as soon as demining would start and not wait till the full clearance of their ancestral localities which has taken several years. Another reason behind the weaker and insignificant associations between landmine clearance and population comes from the fact that landmine clearance may foster development, promoting agglomeration, but at the same time, it may allow people residing in remote areas to leave and move to bigger towns and communities. [This is an issue that the "market access" estimation is taking into account.]

2.2 Building New Roads and Improving Pre-Existing Ones

Going over the documents on the history of demining it becomes clear that the latter enabled access to previously unusable segments of the network and often times upon the completion of demining there were improvements on the transportation network. As an illustrative example among the many we encountered, a report from a HALO Trust operation in Lapala (in Nampula province in the North) in 2002 states that "*clearance will allow the rehabilitation of the [affected] road. Demining will benefit the local population and restore the free circulation of vehicles. Moreover, vehicles will be able to avoid the big detour they currently face in the vicinity of Lapala village.*" At the same time, since the end of the civil war many new roads have been constructed. A natural question is how the timing of demining maps into these changes in the transportation network.

To answer this question we collected information on the Mozambican transportation network including roads, railways and navigable rivers. Information on the road network was kindly provided by the National Road Administration (ANE), which produced a detailed georeferenced database of the Mozambican roads for three different points in time. Namely, 1998, 2003, and 2011. For each road segment we have information on the conditions (paved, unpaved or trail) and quality (good, fair, bad). Data for the railways network come from the Ministry of Transport and Communication. For each of the rail corridors, we were able to identify the name and the length of each segment. There are three main railways, all connecting the coastal areas in the Indian Ocean to inland: the Northern line links Nacala to Malawi; the central line connects Beira to Zimbabwe; and the Southern route goes from Maputo to South Africa. A peculiar feature of the Mozambican rail network, intimately connected to its colonial experience, is the absence of any connection among these three main corridors. We also collected data on navigable rivers from the Ministry of Transportation (and we are in the process of getting data on port cities). We count 12 navigable rivers in Mozambique.[1] With the exception of the Zambezi, Mozambican rivers do not allow large or medium-sized boats to sail and are far less exploited than road and rail.

[1] Namely, Buzi, Chinde, Incomati, Limpopo, Lugenda, Lurio, Messalo, Pungwe, Ruvuma, Save, Tembe, Zambezi.

We then digitized information on the conditions and quality of the transportation network in the colonial era. We accessed a map from the colonial archives in Maputo from 1973 depicting both roads and railroads infrastructure. Analogous to the 2011 roads data, we retrieved detailed information and reconstructed the classification of the colonial road network into paved, unpaved or trail conditions. Regarding the railroads, we complemented the information from the colonial archives with self-collected sources on the railroad conditions and status (functioning or destroyed) at the end of the Civil War in 1992.[2]

Table 2 gives panel estimates that associate new road building and improvements of the pre-war transportation network with landmine clearance. In columns (1)-(2) the dependent variable is an indicator that takes the value one if a new road appears in the locality at the end of each of the four periods of demining (namely in 1992, 1999, 2007, and 2015). In columns (3)-(4) the dependent variable reflects whether there has been an improvement in the colonial transportation network (of 1973). The estimated coefficients in (1) and (3) suggests that localities that experienced a larger number of clearance interventions were both more likely to have new roads and see improvements in the pre-existing network. Upon full clearance of a locality from CHA, new roads were not more likely to be built (column (2)), but existing roads were more likely to be upgraded.

3 Sensitivity Checks. Local Effects of Demining

3.1 Controlling for New Roads and Improvements in the Pre-Civil-War Road Network

A natural question that comes from the earlier results (in Table 2), is whether the demining - luminosity association (uncovered in Table 2) is (partly) driven by improvements in the transportation network that is also linked to landmine clearance. We address this inquiry, in Table 3 we repeat estimation of the baseline (difference-in-difference empirical specification) associating luminosity with landmine clearance, controlling for changes (new roads and improvements) in the local transportation infrastructure. The coefficient on demining declines by $5\% - 10\%$ suggesting that a small part of the local influence of demining on economic performance operates via the improvement of the local transportation network.

[2]We interviewed several experts and consulted the archives of the Ministry of Transportation in Maputo.

3.2 Dropping Maputo Province

We examine the stability of the estimates when excluding the Maputo Province, as both luminosity and contamination are substantially high. In Maputo Province, 30% of localities were already lit in 1992 (with the country average being just 9%). Contamination was also considerable in the province (though not in the capital), affecting 91% of the localities. Table 4 reports the fixed effects estimates when we drop the 78 localities of Maputo province. The table structure "mirrors" Table 2 of the main paper that presented the baseline panel fixed-effect estimates. There is a strong link between demining activities and luminosity. The "beta" coefficient of the logarithm of (1 + number of cleared CHA) increases by 9%-13%, whereas the coefficient on complete clearance is almost identical to the one reported in the Table.

3.3 Dropping Big Cities (Maputo, Beira, Nacala)

We also estimated specifications dropping the three big cities, Maputo, Beira, and Nacala, as in the end of conflict in 1992, these cities were packed with refugees. Moreover, development is considerably higher in these three cities. Table 5 replicates our baseline specification estimates dropping the three localities hosting the largest cities, Nacala in the North, Beira in the Center, and Maputo in the South. The results are very similar to the baseline local estimates. There is a significantly positive within-locality association between luminosity and landmine clearance; localities with high luminosity are not driving the association.

3.4 Northern Provinces

We restricted estimation to the less developed Northern provinces. This is useful for a couple of reasons. First, it is a good "internal" validity check as the Northern provinces have been (and still are) disconnected from the South and Centre. Second, due to various historical reasons, the Mozambican North was way less developed than the South. Third, the Northern provinces were freed from landmine contamination in 2007 and thus we have a considerable post-clearance number of observations. Fourth, as Halo Trust was the dominant demining operator, we look in a sample of localities cleared by the same NGO. Fifth, HALO Trust data appear less noisy. Table 6 replicates the baseline panel fixed-effects specifications in the 590 localities (49.7% of the total) of the country's Northern Provinces (Cabo Delgado, Niassa, Nampula, and Zambezia). The coefficient on the log number of cleared accumulated confirmed hazardous areas (CHA) and the cleared CHA indicator is positive and highly significant.

The estimates are similar to the baseline specifications (in the full sample of localities), reported in Table 2 of the main paper. If anything the implied economic magnitudes are larger, a result that most likely stems from reduced measurement error.

3.5 Lights Transformation

The 2015 measures of luminosity are recorded by a different satellite (VIIRS) than those used up until 2013 (DMSP-OLS) (Michalopoulos and Papaioannou (Forthcoming)). To make the measurements of the two satellite data comparable we have followed Li, Li, Xu, and Wu (2017). But one may wonder how this transformation affects the results. In Table 7 we run the baseline panel specifications stopping in 2013 (rather than going till 2015), as this allows using data from DMSP-OLS. As of 2013, 87 localities (10.1% of the universe of contaminated ones) are still not fully cleared; and 35.30% of the localities are lit in 2013. Stopping in 2013 does not change the overall picture. While the estimated coefficients drop slightly, the relationship between demining and luminosity retains significance.

3.6 Dynamic Panel Estimates

We estimated dynamic panel specifications, allowing for inertia in the dependent variable. As the time dimension exceeds 20, the "Nickell-bias" emerging from the joint inclusion of the lagged dependent variable and the locality-specific constants is unlikely to be large. Table 8 reports the dynamic panel estimates. There is inertia in luminosity, as the autoregressive term AR(1) coefficient (a_1) is around $0.4 - 0.5$. The estimate on the log number of CHA and the cleared dummy retain their statistical significance. Given persistence in luminosity, the "long-run" effect of landmine clearance on luminosity is higher than the "short-term" effect ($\beta_{LT} = \frac{\beta_{ST}}{1-a_1}$). This is consistent with the "long/medium-run" association between landmine clearance and local economic activity (reported in in Table 2, columns (4)-(8) and in Table 3) being larger than the estimates reported in Table 2, columns (1)-(4).

3.7 First and Last Intervention

We also examined whether development-urbanization, as reflected in luminosity, increases with the first/initial demining operation or whether luminosity increases when the locality is completely cleared by contamination. Table 9 reports the results. Luminosity increases consistently when after a locality is fully cleared by contamination. Luminosity in the years between the first and the last CHA intervention is not statistically different from the average luminosity before the first intervention. This lack of significance mitigates also concerns that the positive association between landmine clearance and luminosity is driven by the presence of deminers on the ground or because of contemporaneous development projects. If this was the case, the association between luminosity and clearing landmines would become manifest as soon as the first intervention commences. The fact that luminosity increases after the locality is fully cleared suggests that development-urbanization spikes once the area is free of CMA.

3.8 Restricting Estimation to Contaminated Localities

We also estimated quite restrictive specifications looking only on the sample of contaminated by landmines localities. Omitting localities without any CHA is inefficient, as, by dropping the "pure control" group, we do not properly account for general trends and dynamics in luminosity. Yet, exploiting (within-locality) variability looking only on contaminated areas, we perhaps account well for hard-to-observe differential growth trends in the two groups of localities. Table 10 presents the results. Across all perturbations, the coefficient on the cleared CHA indicator and the log number of cleared CHA is positive and statistically different than zero. The estimate is quite similar to the full-sample (baseline) estimates, reported in Table 2, though somewhat less precisely estimated. In spite of relying solely on variation in the timing of clearance within contaminated localities, the link between luminosity and CHA clearance retains economic and statistical significance.

3.9 Collapsing Demining Intervention at Site Level

We rerun our main specification after collapsing the data at the site level. Multiple demining interventions might be linked to the same hazardous areas (see Appendix III for further details). After aggregating the $7,423$ interventions, we obtain 6712 hazardous areas. This aggregation is innocuous both for the number of affected localities (855) and for the timing of full clearance (average duration is 6.89 years). Table 11 that "mirros" Table 3 of the main body gives the results. The estimate is almost identical to the intervention baseline estimates.

3.10 Admin-3 Unit Analysis

We conduct our analysis at the locality level, the finest administrative (level 4) units of Mozambique. This allows accounting at the finest possible-level for local features and unobservable features (by the inclusion of admin-4 unit fixed-effects. We explored the sensitivity of the luminosity - CHA clearance association conducting the analysis at coarser, admin-3 units". We aggregated the luminosity and demining data across admin-3 units ("Postos Administrativos") and rerun the baseline panel fixed-effects specifications across 417 admin-3 units over the period $1992 - 2015$. This serves two purposes: First, it reduces measurement error on the spatial dimension of the data. Second, using a larger unit of analysis partially accounts for spatial (though still localized) spillovers. The aggregation at admin-3 level stresses the severity of landmine contamination: out of the 417 admin-3 units, 379 "Postos" (90%) were contaminated by landmines. Table 12 gives the results. The within-postos correlation between luminosity and landmine clearance is quite strong. The coefficients are statistically significant in all permutations. The estimates (and standardized coefficients) are somewhat larger than the baseline one (estimated at the finer level), hinting to the positive externalities of demining.

3.11 Confirmed Hazardous Areas vs "Cancelled" Suspected Hazardous Areas

As we explain in detail in the Data Appendix and briefly in the main text, the verification check of whether a suspected hazardous areas (SHA) was indeed contaminated (and consequently classified as a CHA) frequently resulted in the cancellation of the suspected threat. Naturally, one may wonder whether the sheer reclassification of false positives was important for local economic activity. To answer this question we distinguish between hazardous areas where contamination was confirmed (CHAs) and those hazardous areas that were suspected of being contaminated, but upon closer examination by the surveyors were "cancelled" on the basis of false or inaccurate information (canceled SHA). We then test whether luminosity correlates with the actual detonation of landmines or whether the correlation is also present when the fear of potential contamination is dispelled.

Before discussing the panel estimates, a note of caution is in order. Reading over the reports of "cancelled" SHAs reveals that the local community was often aware that the presumed area was in fact not contaminated, as often it was already in use. For example, in Nunge (Cabo Delgado) HALO Trust team visited a suspected hazardous area in 2002 and, after interviewing the local population, cancelled the SHA because "*locals stated that landmines were never affected the community and the SHA was on a parcel of land that was cultivated*". So, often the "cancelled" SHAs reflected inefficient initial surveying rather than a true misunderstanding of the locals regarding the presence of mines. Keeping these caveats into account, we added to the $7,423$ CHAs interventions, an additional $1,994$ SHAs that were canceled. For each of these SHAs, we have information on the date of "cancellation".

So we run the baseline empirical panel models, associating luminosity with both the log of (1 +

number of cleared CHAs) and the log (1 + number of cancelled SHAs). Table 13 reports the results. The log number of CHA continues to enter with a significantly positive coefficient; the estimate is also quite similar to the one in Table 2. In contrast, luminosity is not systematically related to cancelled SHA that were based on inaccurate information. The estimate on the "cancelled" suspected hazardous areas variable is small, changes, sign and does not pass standard significance levels in any of the perturbations.

4 Heterogeneity

In this section, we first show that the GIS-based heterogeneity of landmine clearance on local development-urbanization -presented in Table 4 of the main paper- are robust to different distance cutoffs for the definition of the non-mutually exclusive GIS categories of confirmed hazardous areas. Second, we present estimates exploring heterogeneity of landmine clearance on luminosity with respect to locality features. Third, we explore heterogeneity of the luminosity -clearance correlation using the CHA reports of clearance.

4.1 Alternative GIS Classification Thresholds

We examined whether the findings of Table 4 in the main body revealing sizable heterogeneity of landmine clearance on luminosity are robust to altering the distance cutoffs in how we classify landmine contamination. Specifically, we double the thresholds of all 7 non-mutually exclusive categories, namely: (*i*) landmines close to roads and railroads (200 meters); (*ii*) CHA close to the national border (2 kilometers); (*iii*) landmine and UXO sites close to commercial hubs (2 kilometers); (*iv*) landmine threats close to areas experiencing major civil war incidents (2 kilometers); (*v*) CHA close to rivers (200 meters); (*vi*) CHA close to electricity pylons (200 meters); (*vii*) CHA close to major villages or towns (2 kilometers); and (*viii*) a residual category. Table 14 reports the results. The patterns are similar to those shown in Table 4. Landmine clearance along roads and railways enters with a significantly positive estimate (with "beta coefficients" that are somewhat larger than the ones in Table 4). The within-locality correlation between luminosity and CHA clearance is also stronger for demining operations clearing villages/towns and colonial commercial harbors (*cantinas*). In contrast, clearance operations in proximate to borders areas and rural places (the residual category) are associated with falls in luminosity. This is in line with the narrative that clearing border areas allowed internally displaced people and refugees residing in camps at the border to return of their hometowns.

4.2 Locality Features

As discussed in the main part of the paper, we also explored heterogeneity with respect to *locality* features. To do so, we split the sample of localities into subsamples based on local features (connectivity to the pre-independence transportation network, pre-civil war population, surveyed or not) and repeated the panel estimation. Table 15 presents the results.

Connected - Non-Connected Localities First, we examined whether the influence of clearance on local development-urbanization (as reflected in luminosity) is larger for localities that were connected to the colonial transportation network in 1973. To do so, we split the sample into a "Connected" subsample consisting of 888 localities that had some type of transportation mode in 1973 and a "Non-Connected" subsample consisting of the remaining 299 localities that were not crossed by the 1973 transportation network nodes and repeated estimation in the two sub-samples. We run separate panel regressions in the two subsamples to allow each subset of localities to have its own growth trajectory. Column (1) shows that clearing a connected locality increases the probability of lit by 3.7%; this estimate is similar to the baseline estimate in Table 2 of the main paper. Conversely, the specification in column (2) shows that the effect of demining in non-connected localities is small (coefficient 0.05) and indistinguishable from zero. As the quality of connection varies for the different elements of the colonial transportation network, we defined indicator variables reflecting whether a connected locality was crossed by *i*) a paved road, *ii*) an unpaved road, *iii*) a trail, and *iv*) and a railway. Column (3) reports panel estimates in the subsample of connected to the 1973 localities (same subsample as in column (1)). Among connected localities demining those hosting a paved road and a railroad enjoyed the largest increase in luminosity. The probability of lit increases by 6.2% for localities with a paved road in 1973 and for those with a colonial railway. Clearance of localities with unpaved roads is also associated with increases in luminosity, though the estimate (0.049) is imprecise and does not pass standard significance thresholds.

Population Density Second, we examined whether the correlation between luminosity and landmine clearance differs with respect to pre-civil-war population density. We split the sample of 1107 localities into five subgroups based on the 1980 population count and rerun the baseline panel specification in each of the five quintiles. Table 15 columns (4)-(8) give the results. The luminosity -

landmine clearance association is strong (and precisely) estimated in more densely populated localities. The estimate in the largest quintile is 0.064, implying sizable effects of landmine clearance on local development-urbanization The estimate is around $0.04 - 0.045$ for localities in the fourth, third, and second quintile. The estimate is small (0.02) and statistically insignificant in the subsample of low population density localities.

Surveyed and Non-Surveyed Localities Third, we distinguished between localities whose CHAs were indicated in the 1994 SHAMAN or the 2001 MLIS surveys and those that were not. Finding that the link between demining CHAs and luminosity is robust in both samples would alleviate concerns that the observed relationship is driven by the sample of demining in initially (non) surveyed localities. Table 15 columns (9)-(10) give the results in the two subsamples. Landmine clearing is predictive of increases in luminosity in both subsamples.[3]

4.3 Report-Based Categorization of CHAs

An alternative way to group clearance activities into different categories is from reading each technical and completion report. Going over 7,243 interventions we classified demining operations into 10 non-mutually exclusive categories. In Table we report the breakdown. The largest categories concern contamination of electricity pylons (13%), footpaths (11.5%), farm (9%), CHAs in residential areas (9%), roads, railways, and bridges (7.7%) and in areas of military importance (7%). Appendix Table 16 mirrors Table 4 of the main body. The difference is that now instead of classifying CHAs by locating them along key features of the country's infrastructure, we use the report-based classification described above and allow the coefficient of clearance to vary for each type. Similar, to what we found in Table 3 clearing borders seems to negatively impact luminosity in the year of the clearance (but not over the 7-year horizon).

Also, demining of residential places as well as of public infrastructure-related CHAs increases economic activity as captured by images of satellite light density at night. The correlation between clearing CHAs along roads and railroads has a insignicant positive impact on lit (dummy). The report-based category that has a consistently positive impact on local development concerns interventions that the reports did not indicate what was the type of contamination (Not Classified). This are interventions for which the report description was either left blank or not useful to derive a classification. In an

[3]The median contamination across surveyed localities is 6 threats whereas the respective statistic is zero for the non-surveyed ones which may explain the slightly stronger impact of demining for surveyed localities.

effort to better understand what type of CHAs were not classified in the reports we cross-tabulated the GIS-based classification with the report-based one. There are a total of $2,926$ CHAs for which the reports do not mention the type of the affected area. When we look where these unclassified areas of contamination belong to, according to the GIS categorization, it becomes apparent why the former enter in the regression with a consistently positive sign. Around 42% of these $2,659$ "unclassified" CHAs can be found along roads, railroads, points of commercial importance and in towns and villages.

We would have liked to use the report-based classification to guide our analysis on heterogeneity. However, the fact that for about 40% of the interventions on CHAs we have no information on the affected areas and it is precisely these contaminated points whose clearance matters most for regional development (and that the majority of these unclassified areas could be binned into meaningful categories based on their actual location) that we decided to use the location-based categorization.

Tables

Table 1: **Long-Run Differences, 2007-1980. Population as Outcome**

	Δ Log Pop	Δ Log Pop	Δ Log Pop	Δ Log Pop
	(1)	(2)	(3)	(4)
Δ Cleared Threats	0.063***		0.081***	
	(0.021)		(0.025)	
	[0.077]		[0.099]	
Cleared (dummy)		0.076		0.021
		(0.054)		(0.048)
		[0.046]		[0.013]
Paved Road 1973 (dummy)			0.452***	0.477***
			(0.059)	(0.060)
			[0.218]	[0.230]
Unpaved Road 1973 (dummy)			0.220*	0.242*
			(0.132)	(0.130)
			[0.040]	[0.044]
Trail 1973 (dummy)			0.216***	0.238***
			(0.053)	(0.053)
			[0.127]	[0.140]
Railway 1973 (dummy)			0.157**	0.175**
			(0.079)	(0.079)
			[0.066]	[0.074]
Navigable River (dummy)			0.002	0.006
			(0.066)	(0.066)
			[0.001]	[0.003]
Civil War (dummy)			0.153***	0.192***
			(0.051)	(0.049)
			[0.071]	[0.089]
Cantinas (dummy)			0.115**	0.118**
			(0.047)	(0.047)
			[0.070]	[0.072]
Log - Population Density 1980			-0.471***	-0.461***
			(0.038)	(0.037)
			[-0.903]	[-0.884]
Log - Luminosity 1992			0.043***	0.041***
			(0.010)	(0.010)
			[0.160]	[0.154]
Log - Land			-0.494***	-0.468***
			(0.050)	(0.048)
			[-0.706]	[-0.669]
Province FE	Yes	Yes	Yes	Yes
R-squared	.124	.12	.417	.41
Observations	1,077	1,077	1,077	1,077

Notes: The table reports long-run difference OLS specification estimates associating changes in log population (over the period 2007-1980) with demining activities and various control variables. In all specifications, the dependent variable is the change in the logarithm of population between 2007 and 1980. Columns (1) and (2) give unconditional specification estimates. Columns (3)-(6) include a rich set of control variables, namely: indicator (dummy) variables that take the value of one when a locality is crossed by the key elements of the1973 transportation network (Paved Road, Unpaved Road, Trails, and Railway); indicator variables for the presence of navigable river, the presence of colonial commercial harbour (*Cantinas*), and for localities affected by major civil war incidents. The set of control variables also include log population density (using the 1980 census), log luminosity in 1992 (before landmine clearance operations commence), and log land area. All specifications include province fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses and standardized beta coefficients (in squared brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 2: **New Roads and Old Network Improvement**

	Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	New Road (dummy)		Old Net Improvement (dummy)	
	(1)	(2)	(3)	(4)
Cleared Threats	0.039***		0.080***	
	(0.010)		(0.011)	
	[0.084]		[0.159]	
Cleared (dummy)		-0.001		0.069***
		(0.018)		(0.019)
		[-0.001]		[0.065]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes
R-squared	.351	.346	.441	.432
Observations	4,748	4,748	4,748	4,748

Notes: The table reports panel fixed-effects OLS estimates associating new road construction (in columns (1)-(2)) and improvement over the pre-independence road network (in columns (3)-(4)) with landmine clearance operations. Estimation is run at the three main periods of landmine clearance (1992-1999, 2000-2007, and 2008-2015). In columns (1) and (2), the dependent variable is an indicator that takes the value of one in the period and all subsequent periods of a new road construction in a given locality. In columns (3)-(4), the dependent variable is an indicator variable that takes the value of one in the period and all subsequent periods following the improvement/expansion of an old road (corresponding to the 1973 road infrastructure network). Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized beta coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 3: **Land Mine Removal and Local Development. Controlling for New Road**

	Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit	
	(1)	(2)	(3)	(4)
Cleared Threats	0.433***		0.053***	
	(0.097)		(0.011)	
	[0.099]		[0.119]	
Cleared (dummy)		0.719***		0.079***
		(0.180)		(0.020)
		[0.079]		[0.084]
New Road (dummy)	0.003	0.080	0.017	0.026
	(0.204)	(0.204)	(0.023)	(0.023)
	[0.000]	[0.009]	[0.017]	[0.027]
Old Network Improved (dummy)	0.448**	0.521***	0.044**	0.054***
	(0.184)	(0.182)	(0.020)	(0.020)
	[0.052]	[0.060]	[0.050]	[0.060]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes
R-squared	.242	.241	.225	.222
Observations	4,748	4,748	4,748	4,748

Notes: The table reports FE effects estimates associating luminosity with demining activities, controlling for the construction of new roads and improvements over the old road network. In columns (1) and (2), we control for an indicator that equals one when a new road was built; in columns (3)-(4), we include a dummy equals one if an old road was improved. All specifications include Locality and Province × Period fixed effects. Standard errors in parentheses are clustered at the District (admin 2) level. Beta coefficients are reported in squared brackets. Squared ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 4: **Land Mine Removal and Local Development. Dropping Maputo Province**

	Yearly				Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cleared Threats	0.358***		0.042***		0.512***		0.064***	
	(0.075)		(0.007)		(0.104)		(0.011)	
	[0.080]		[0.092]		[0.121]		[0.146]	
Cleared (dummy)		0.386***		0.039***		0.756***		0.084***
		(0.114)		(0.011)		(0.187)		(0.021)
		[0.041]		[0.041]		[0.088]		[0.093]
Number of Localities	1,109	1,109	1,109	1,109	1,109	1,109	1,109	1,109
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.162	.159	.124	.12	.237	.233	.226	.22
Observations	25,507	25,507	25,507	25,507	4,436	4,436	4,436	4,436

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, dropping localities in the Maputo Province. The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(4) report yearly specification estimates (1992-2015). Columns (5)-(8) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized beta coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 5: **Land Mine Removal and Local Development. Dropping Maputo, Beira, and Nacala**

	Yearly				Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cleared Threats	0.330***		0.037***		0.469***		0.058***	
	(0.073)		(0.007)		(0.099)		(0.011)	
	[0.072]		[0.081]		[0.108]		[0.130]	
Cleared (dummy)		0.375***		0.038***		0.757***		0.083***
		(0.109)		(0.011)		(0.182)		(0.020)
		[0.037]		[0.038]		[0.083]		[0.089]
Number of Localities	1,184	1,184	1,184	1,184	1,184	1,184	1,184	1,184
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.169	.166	.124	.121	.241	.238	.225	.22
Observations	27,232	27,232	27,232	27,232	4,736	4,736	4,736	4,736

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, dropping the largest city in the South (Maputo), Centre (Beira), and North (Nacala). The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(4) report yearly specification estimates (1992-2015). Columns (5)-(8) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized beta coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 6: **Land Mine Removal and Local Development. Only North**

	Yearly				Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cleared Threats	0.345***		0.036***		0.564***		0.065***	
	(0.077)		(0.008)		(0.109)		(0.013)	
	[0.090]		[0.093]		[0.146]		[0.156]	
Cleared (dummy)		0.342***		0.033**		0.666***		0.071***
		(0.116)		(0.013)		(0.214)		(0.025)
		[0.046]		[0.044]		[0.091]		[0.091]
Number of Localities	590	590	590	590	590	590	590	590
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.118	.114	.105	.101	.197	.189	.199	.191
Observations	13,570	13,570	13,570	13,570	2,360	2,360	2,360	2,360

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, focusing on the 590 localities of the 4 Northern Provinces (Zambezia, Nampula, Niassa, and Cabo Delgado). The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(4) report yearly specification estimates (1992-2015). Columns (5)-(8) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized beta coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 7: **Land Mine Removal and Local Development. Stopping in 2013**

	Yearly				Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cleared Threats	0.291***		0.031***		0.360***		0.038***	
	(0.073)		(0.007)		(0.098)		(0.011)	
	[0.062]		[0.067]		[0.080]		[0.088]	
Cleared (dummy)		0.306***		0.029***		0.349**		0.031*
		(0.111)		(0.011)		(0.176)		(0.018)
		[0.029]		[0.028]		[0.037]		[0.033]
Number of Localities	1,187	1,187	1,187	1,187	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.157	.154	.105	.103	.221	.217	.176	.172
Observations	26,114	26,114	26,114	26,114	4,748	4,748	4,748	4,748

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, stopping in 2013 and using the value of luminosity as detected by the Defense Meteorological Satellite Program's Operational Linescan System satellite. The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(4) report yearly specification estimates (1992-2015). Columns (5)-(8) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized beta coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 8: **Land Mines Removal and Local Development. Dynamic Panel**

	Yearly			
	Log Luminosity		Lit	
	(1)	(2)	(3)	(4)
Cleared Threats	0.156***		0.019***	
	(0.037)		(0.004)	
	[0.033]		[0.042]	
Cleared (dummy)		0.163***		0.018***
		(0.058)		(0.007)
		[0.016]		[0.018]
Log - Luminosity First Lag	0.504***	0.505***		
	(0.019)	(0.019)		
	[0.491]	[0.492]		
Lit (dummy) First Lag			0.387***	0.389***
			(0.018)	(0.018)
			[0.380]	[0.381]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes
R-squared	.362	.361	.229	.228
Observations	24,927	24,927	24,927	24,927

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, controlling for the lagged value of luminosity in all specification. The dependent variable in columns (1)-(2) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(2) report yearly specification estimates (1992-2015). Columns (3)-(4) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized beta coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 9: **Land Mine Removal and Local Development. Intermediate Period**

	Yearly		Demining-Phase Estimation (1992, 1999, 2007, 2015)	
	Log Luminosity	Lit	Log Luminosity	Lit
	(1)	(2)	(3)	(4)
First Intervention (dummy)	-0.103	-0.010	-0.351**	-0.039**
	(0.084)	(0.009)	(0.149)	(0.018)
	[-0.012]	[-0.012]	[-0.042]	[-0.045]
Cleared (dummy)	0.421***	0.043***	0.972***	0.107***
	(0.118)	(0.012)	(0.197)	(0.023)
	[0.042]	[0.043]	[0.106]	[0.114]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes
R-squared	.166	.121	.239	.22
Observations	27,301	27,301	4,748	4,748

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, distinguishing between first intervention and last intervention at the locality level. The dependent variable in columns (1)-(3) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (2)-(4) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(2) report yearly specification estimates (1992-2015). Columns (3)-(4) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized beta coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 10: **Land Mine Removal and Local Development. Affected Only.**

	Yearly				Demining-Phase Estimation (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cleared Threats	0.337***		0.038***		0.511***		0.062***	
	(0.089)		(0.009)		(0.116)		(0.013)	
	[0.074]		[0.084]		[0.120]		[0.143]	
Cleared (dummy)		0.246*		0.024*		0.747***		0.067**
		(0.133)		(0.013)		(0.229)		(0.026)
		[0.026]		[0.025]		[0.086]		[0.075]
Number of Localities	855	855	855	855	855	855	855	855
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.178	.175	.133	.13	.264	.259	.248	.241
Observations	19,665	19,665	19,665	19,665	3,420	3,420	3,420	3,420

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, focusing on the 855 (786) contaminated localities. The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(4) report yearly specification estimates (1992-2015). Columns (5)-(8) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized beta coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 11: **Land Mine Removal and Local Development. Collapsing Interventions at Site Level**

	Yearly				4 Years (1992, 1999, 2007, 2015)			
	Log Luminosity		Lit		Log Luminosity		Lit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log - Number of Accumulated Cleared Threats	0.335***		0.037***		0.488***		0.060***	
	(0.078)		(0.008)		(0.105)		(0.011)	
	[0.069]		[0.078]		[0.108]		[0.130]	
Cleared (dummy)		0.367***		0.037***		0.722***		0.080***
		(0.109)		(0.011)		(0.180)		(0.020)
		[0.036]		[0.037]		[0.079]		[0.086]
Number of Localities	1,187	1,187	1,187	1,187	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.168	.166	.124	.121	.241	.238	.224	.219
Observations	27,301	27,301	27,301	27,301	4,748	4,748	4,748	4,748

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, after collapsing demining interventions at the site level. The dependent variable in columns (1)-(2) and (5)-(6) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) and (7)-(8) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(4) report yearly specification estimates (1992-2015). Columns (5)-(8) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized beta coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 12: **Land Mine Removal and Local Development. Admin 3 Estimates.**

	Yearly		Demining-Phase Estimation (1992, 1999, 2007, 2015)	
	Log Luminosity	Lit	Log Luminosity	Lit
	(1)	(2)	(3)	(4)
Cleared Threats	0.398***	0.041***	0.532***	0.057***
	(0.108)	(0.012)	(0.147)	(0.017)
	[0.101]	[0.104]	[0.144]	[0.151]
Number of Postos	417	417	417	417
Posto FE	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes
R-squared	.24	.167	.381	.339
Observations	9,591	9,591	1,668	1,668

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, using the 417 Posto (admin 3) as unit of observations. The dependent variable in columns (1)-(3) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (2)-(4) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(2) report yearly specification estimates (1992-2015). Columns (3)-(4) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized beta coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 13: **Land Mine Removal and Local Development. Suspected and Confirmed Hazardous Areas**

	Yearly		Demining-Phase Estimation (1992, 1999, 2007, 2015)	
	Log Luminosity	Lit	Log Luminosity	Lit
	(1)	(2)	(3)	(4)
Cleared Threats	0.336***	0.036***	0.506***	0.057***
	(0.076)	(0.007)	(0.109)	(0.012)
	[0.072]	[0.077]	[0.116]	[0.128]
Cancelled Threats	-0.045	0.008	-0.163	0.002
	(0.112)	(0.011)	(0.147)	(0.016)
	[-0.007]	[0.012]	[-0.024]	[0.003]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes
R-squared	.168	.124	.241	.224
Observations	27,301	27,301	4,748	4,748

Notes: The table reports panel fixed-effects OLS estimates associating luminosity with landmine clearance, distinguishing between cleared Confirmed Hazardous Areas (CHAs) and "cancelled Suspected Hazardous Areas (SHAs). The dependent variable in columns (1)-(3) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (2)-(4) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(2) report yearly specification estimates (1992-2015). Columns (3)-(4) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. Cleared Threats is the logarithm of one plus the number of cumulated cleared confirmed hazardous areas (CHA) in the locality in given year (period). Cancelled Threats is the logarithm of one plus the number of cumulated cancelled suspected hazardous areas (SHA) in the locality in given year (period). All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized beta coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 14: **Heterogeneity. GIS-based Categories. Doubling Thresholds**

	Yearly		Demining-Phase Estimation (1992, 1999, 2007, 2015)	
	Log Luminosity	Lit	Log Luminosity	Lit
	(1)	(2)	(3)	(4)
Cleared Threats:				
- Road and Railway (200m)	0.313**	0.033**	0.398**	0.049**
	(0.136)	(0.015)	(0.187)	(0.022)
	[0.041]	[0.044]	[0.055]	[0.066]
- Border (20000m)	-0.651***	-0.057***	-0.656***	-0.052**
	(0.173)	(0.018)	(0.216)	(0.025)
	[-0.057]	[-0.050]	[-0.061]	[-0.047]
- Cantinas (2000m)	0.322*	0.043**	0.586***	0.069***
	(0.175)	(0.017)	(0.200)	(0.022)
	[0.035]	[0.047]	[0.067]	[0.076]
- Civil War (2000m)	0.589***	0.030	0.749**	0.041
	(0.222)	(0.021)	(0.296)	(0.029)
	[0.051]	[0.026]	[0.068]	[0.036]
- River (200m)	0.262	0.026	0.030	0.011
	(0.537)	(0.058)	(0.614)	(0.068)
	[0.008]	[0.008]	[0.001]	[0.004]
- Village (2000m)	0.427***	0.038***	0.534***	0.048***
	(0.114)	(0.012)	(0.144)	(0.016)
	[0.065]	[0.058]	[0.085]	[0.075]
- Electricity Grid (200m)	0.420	0.036	0.332	0.020
	(0.286)	(0.029)	(0.286)	(0.032)
	[0.021]	[0.018]	[0.018]	[0.011]
- Residual	-0.255***	-0.014	-0.316***	-0.014
	(0.084)	(0.009)	(0.108)	(0.012)
	[-0.038]	[-0.021]	[-0.051]	[-0.022]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes
R-squared	.189	.136	.271	.242
Observations	27,301	27,301	4,748	4,748

Notes. The table reports reports panel fixed-effects OLS estimates exploring the heterogeneity of the effect of demining activities on local development according on the type of CHA categories. The dependent variable in columns (1)-(2) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(2) report yearly specification estimates (1992-2015). Columns (3)-(4) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. We split our variable of Number of Accumulated Cleared Threats into seven non-mutually exclusive categories, according to some GIS-based distance thresholds. We classify the different categories in the following way: i) Roads and Railways if the centroids of the threats is in a buffer of 200m from a road or a railway; ii) Border if the centroids of threats is less than 20000m from the country border; iii) Cantinas if the centroids of threats is less than 2000m from a village with a colonial commercial hub; iv) Civil War if the centroids of the threat is in a buffer of 2000m from an event of the Civil War; v) River if the centroids of the threat is less than 200m distant form a river or lake; vi) Village if the threat centroid is in a buffer of 2000m from a village; and Electricity Grid if the centroid of the threat is in a buffer of 200m from the electric grid and pylons. The Residual category includes all the remaining threats. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized beta coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 15: Heterogeneity on Municipality Characteristics

	Transportation Network			Population Density 1980					Survey	
	Connected	Non Connected	Connected	1st Q	2nd Q	3rd Q	4th Q	5th Q	Survey	No Survey
	Lit	Lit	Lit	Lit	Lit	Lit	Lit	Lit	Lit	Lit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Cleared (dummy)	0.036***	0.005		0.020	0.042*	0.039	0.046**	0.064*	0.041***	0.032*
	(0.013)	(0.016)		(0.013)	(0.023)	(0.025)	(0.022)	(0.032)	(0.014)	(0.017)
	[0.035]	[0.006]		[0.030]	[0.053]	[0.040]	[0.044]	[0.050]	[0.043]	[0.030]
Cleared (dummy) ×										
Paved 1973 (dummy)			0.062**							
			(0.028)							
			[0.030]							
Cleared (dummy) ×										
Unpaved 1973 (dummy)			0.049							
			(0.069)							
			[0.008]							
Cleared (dummy) ×										
Trail 1973(dummy)			-0.000							
			(0.014)							
			[-0.000]							
Cleared (dummy) ×										
Rail (dummy)			0.062**							
			(0.031)							
			[0.028]							
Number of Localities	888	299	888	216	215	216	215	215	659	528
Locality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	.14	.0623	.142	.0715	.131	.13	.153	.197	.135	.104
Observations	20,424	6,877	20,424	4,968	4,945	4,968	4,945	4,945	15,157	12,144

Notes: The table reports FE effects estimates associating luminosity with demining activities, allowing for heterogeneity at locality characteristics such as i) localities connected [columns(1) and (3)] and non-connected [column (2)] colonial transportation network, ii) population density quintiles [columns (4)-(8)], iii) and localities that were surveyed by the SHAMAN (1994) or the MLIS (2001) [column (9)] and those that were not surveyed [column (10)]. In all specification, the dependent variable is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(10) report yearly specification estimates (1992-2015). Cleared is an indicator variable the takes on the value of 0 when the locality is contaminated and equals one following a locality's clearance of all confirmed hazardous areas (CHA); the indicator equals zero for all localities that were not contaminated. In column (3), we interacted the Cleared dummy with each element of the transportation network (paved, unpaved, trail, and rail). All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported). The table reports clustered at the district (admin 2) level standard errors (in parentheses) and standardized beta coefficients (in square brackets). ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 16: **Heterogeneity. Report-based Categories.**

	Yearly		Demining-Phase Estimation (1992, 1999, 2007, 2015)	
	Log Luminosity	Lit	Log Luminosity	Lit
	(1) Log Luminosity	(2) Lit	(3) Log Luminosity	(4) Lit
Cleared Threats:				
- Road, Railway, Bridges	-0.036	0.010	-0.160	0.001
	(0.162)	(0.017)	(0.234)	(0.026)
	[-0.003]	[0.009]	[-0.014]	[0.001]
- Military	0.459**	0.048**	0.375	0.036
	(0.219)	(0.023)	(0.243)	(0.028)
	[0.035]	[0.038]	[0.030]	[0.029]
- Protection Ring & Residential	0.107	0.008	0.329**	0.031*
	(0.125)	(0.014)	(0.141)	(0.016)
	[0.012]	[0.009]	[0.039]	[0.036]
- Forest & Bush	-0.046	0.011	-0.020	0.013
	(0.214)	(0.022)	(0.313)	(0.037)
	[-0.002]	[0.005]	[-0.001]	[0.007]
- Footpath	-0.270*	-0.007	-0.432**	-0.027
	(0.158)	(0.017)	(0.208)	(0.023)
	[-0.023]	[-0.006]	[-0.040]	[-0.024]
- Farm	0.155	0.015	0.253	0.035
	(0.180)	(0.018)	(0.218)	(0.025)
	[0.012]	[0.012]	[0.021]	[0.028]
- Water Supply	-0.508	-0.054	-0.745	-0.089
	(0.426)	(0.043)	(0.480)	(0.054)
	[-0.020]	[-0.021]	[-0.030]	[-0.035]
- Electricity Pylons	0.291	0.012	0.108	-0.002
	(0.207)	(0.019)	(0.199)	(0.022)
	[0.012]	[0.005]	[0.006]	[-0.001]
- Public Infrastructure	0.436*	0.033	0.710**	0.079**
	(0.261)	(0.026)	(0.309)	(0.032)
	[0.031]	[0.024]	[0.053]	[0.057]
- River	0.184	0.015	0.544*	0.047
	(0.276)	(0.027)	(0.319)	(0.034)
	[0.009]	[0.007]	[0.027]	[0.023]
- Border	-1.175*	-0.120	-0.452	-0.037
	(0.709)	(0.077)	(0.884)	(0.114)
	[-0.020]	[-0.021]	[-0.009]	[-0.007]
- Not Classified	0.256**	0.025**	0.351**	0.039**
	(0.109)	(0.010)	(0.154)	(0.016)
	[0.040]	[0.039]	[0.058]	[0.064]
Number of Localities	1,187	1,187	1,187	1,187
Locality FE	Yes	Yes	Yes	Yes
Year x Province FE	Yes	Yes	Yes	Yes
R-squared	.173	.127	.248	.23
Observations	27,301	27,301	4,748	4,748

Notes. The table reports reports panel fixed-effects OLS estimates exploring the heterogeneity of the effect of demining activities on local development according on the type of CHA categories. The dependent variable in columns (1)-(2) is the log of luminosity plus the half of the minimum value of luminosity. The dependent variable is columns (3)-(4) is an indicator that takes the value of one if the locality emits some detectable from the satellite light (lit). Columns (1)-(2) report yearly specification estimates (1992-2015). Columns (3)-(4) give (7-year) period estimates (1992-1999, 2000-2007, 2008-2015) that correspond to the three main phases of landmine clearance. We split our variable of Number of Accumulated Cleared Threats into twelve non-mutually exclusive categories, according to report-based classification. We classify the different categories in the following way: i) Roads, Railways, and Bridges; ii) Military iii) Protection Ring & Residential ; iv) Forest and Bush; v) Footpath vi) Farm; vii) Water Supply; viii) Electricity Pylons; ix) Public Infrastructure; x) River; xi) Border; xii) Not Classified. The Not Classified category includes all the remaining threats for which a report description was not provided. All specifications include locality fixed-effects and province-specific year (or period) fixed effects (constants not reported).

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