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## Analysis

Can't See the Forest for the Trees: Can Declining Deforestation Trends in the Argentinian Chaco Region be Ascribed to Efficient Law Enforcement? <sup>☆</sup>José Norberto Volante<sup>a</sup>, Lucas Seghezzo<sup>b,\*</sup><sup>a</sup> Instituto Nacional de Tecnología Agropecuaria (INTA), Estación Experimental Agropecuaria Salta, Ruta Nacional 68 Km 172, 4403 Cerrillos, Salta, Argentina<sup>b</sup> Instituto de Investigaciones en Energía No Convencional (INENCO), Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Universidad Nacional de Salta (UNSa), Avenida Bolivia 5150, A4408FVY, Salta, Argentina

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## ABSTRACT

A national “Forest Law” passed in Argentina in 2007 mandated provincial governments to set up and implement land use planning processes in order to protect their native forests and regulate the expansion of large-scale agriculture. A recent study postulates that observed reductions in deforestation in three provinces of the Argentinian “Dry Chaco” ecoregion (namely Salta, Santiago del Estero, and Chaco) can be attributed to the effective enforcement of this law by provincial governments. Yet a more contextualized analysis of the local situation raises a number of objections to the methods used and the conclusions drawn in that study. Our analysis (and first-hand experience) shows that provincial governments were unable to enforce the Forest Law, since deforestation in protected areas continued or even increased after its approval and implementation. Our criticism can be categorized into five major challenges: (1) declining deforestation trends started before the Forest Law; (2) a province with a substantial increase in deforestation was omitted; (3) only part of one ecoregion was taken into account in the analysis; (4) deforestation percentage by conservation categories is better than hectares by province as an indicator of law enforcement; and (5) assigning zones to land units prior to land use planning processes is questionable. These challenges, and the lack of a more complete and nuanced political analysis of the situation on the ground, calls into question both the reliability of the results and the usefulness of the conclusions in the study. Ambiguous or misleading messages from the academic community can have negative political consequences and hinder local conservation efforts in the short term. We should not be so caught up in our desire to see improvements on the ground that we can't see the forest for the trees.

## 1. Introduction

In the last two decades, the “Chaco” region of Argentina experienced an intensive process of deforestation and land use change intended to promote industrial agriculture and increase livestock production (Gasparri and Grau, 2009; Grau et al., 2005; Leake et al., 2016; REDAF, 1999, 2012; Volante et al., 2012; Zak et al., 2008). Traditional uses of the forests such as hunting and gathering, subsistence cattle ranching, timber harvest, and small-scale charcoal production, among others, are in jeopardy (Volante et al., 2012). The resulting environmental and social impacts are predominantly affecting small-scale farmers and indigenous peoples who depend on the products and services provided by the forests (Seghezzo et al., 2016). Land use change in Argentina, as in the entire global South, is known to be particularly sensitive to high international prices of agricultural commodities such as soybean (Fehlenberg et al., 2017; Grau et al., 2005). This change was

also driven by other economic variables such as exchange rates and levels of taxation, by the introduction of genetically-modified herbicide-resistant soybean varieties, and by environmental factors such as changes in rainfall patterns in some areas (Volante et al., 2016). The Chaco region is also receiving livestock from the Pampas in central Argentina, where pasture lands are being taken over by the production of more profitable commodities such as soybean and corn (Paruelo et al., 2006). The pattern of expansion of the so-called agricultural “frontier” in the Chaco region has been subject to differing interpretations. Advocates of the “Forest Transition” theory first postulated by A.S. Mather (Mather, 1992; Mather and Needle, 1998) believe that socio-economic development and agricultural intensification in some areas might lead to a process of total or partial forest recovery in other areas that had been previously deforested for agricultural production (Grau and Aide, 2008; Perz, 2007; Rudel et al., 2005; Rudel et al., 2010). Forest transitions or, more generally, “ecological transitions”

<sup>☆</sup> This article is a reaction to Nolte et al. (2017a).

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(since they also happen in ecosystems other than forests), have been reported in several countries (Aide and Grau, 2004; Baptista and Rudel, 2006; Foster, 1992; Grau et al., 2005; Grau et al., 2008; Izquierdo and Grau, 2009; Lambin and Meyfroidt, 2011; Mather, 2007; Mather and Fairbairn, 2000; Mather et al., 1998, 1999; Perz and Skole, 2003; Turner II, 2010). Recent studies have questioned the widespread applicability of the forest transition theory to the Chaco region (Volante and Paruelo, 2015). Agricultural expansion in this region seems to follow an epidemic-like pattern of “poorly selective contagious advance” in which new clearings are mostly associated with their proximity to already-cleared areas (Volante et al., 2016). As a result, new clearings are not always carried out on highly productive soils in which agriculture intensification can easily take place, leaving little room for marginal areas to recover their original forest profile since they are also put under intensive agricultural production.

The role of national or local governments in the Chaco region of Argentina, as in the rest of the country, has been limited in controlling, let alone planning, land use change. Widespread, uncontrolled deforestation has been taking place in this area for more than four decades (Volante et al., 2012). Growing awareness of the environmental and social consequences of deforestation and land use change finally led to the passing of a national “Forest Law” (Law 26,331) at the end of 2007 (Schmidt, 2015; Seghezzeo et al., 2011). This law mandated provincial states to set up and implement specific Land Use Planning (LUP) processes in order to regulate the protection, enrichment, restoration, utilization and management of native forests and the environmental services they provide. According to this law, native forests were to be classified in three categories: I (high conservation value), II (medium conservation value), and III (low conservation value). These categories had to be represented in maps as different “zones” identified with the colors red, yellow, and green, respectively. The process leading to the passing of the Forest Law was complex and contentious and so was the approval of provincial LUP norms and maps, which took between one and several years, depending on the province. Criticisms were related, among other things, to the lack of genuine public participation and the centralized, techno-centric approaches that have been generally followed by provincial administrations (Seghezzeo et al., 2011, 2016).

In a recent paper, Christoph Nolte and co-authors studied deforestation trends in the dry area of the Chaco region (the “Dry Chaco”) in three Argentinian provinces: Salta, Santiago del Estero, and Chaco (Nolte et al., 2017a). After analyzing data from a large number of plots in these provinces, they concluded that large-scale deforestation had reduced significantly in this region, mainly as a direct consequence of the enforcement of the national Forest Law at the provincial (“sub-national”) level. However, as will be described in more detail below, a more contextualized analysis of the same data used by Nolte and co-authors raises a number of fundamental and methodological objections that can be grouped in five major challenges: (1) declining trends in deforestation started several years before the implementation of the national Forest Law at provincial level; (2) a province (Formosa) with a substantial increase in deforestation during the time period under consideration was omitted; (3) only part of one ecoregion (the dry portion of the Chaco region) was taken into account in the analysis, ignoring deforestation in other ecoregions that were also regulated by the Forest Law; (4) deforestation percentage by conservation categories (red, yellow and green zones) is better than hectares by province as an indicator of law enforcement; and (5) assigning zones to land units before actual land use planning processes took place is questionable. Our criticism originates in the striking discrepancies we identified between the conclusions drawn in the paper and our lived experience on the ground where, together with other scholars and activists, we have been confronting poor enforcement of land use planning laws and regulations for more than a decade. As discussed below, there are other, more plausible alternative explanations to declining deforestation trends. The ambiguous message conveyed by Nolte and co-authors has already had some negative political consequences at the local level and

will not help conservation efforts in the short term. Other organizations and non-profits share our impression; the local branch of Greenpeace, for instance, has just released a report in which it denounces that, despite declining trends in overall deforestation rates in recent years, a significant proportion of deforestation took place in areas explicitly protected by the Forest Law (Greenpeace, 2017). The national coordinator of Greenpeace's forest campaign, speaking to highly influential national media, has been quoted saying that “it is clear that, in many cases, government officials are accomplices of this violation of the law”.<sup>1,2</sup>

## 2. Challenges

### 2.1. Declining Deforestation Trends Started Before the Forest Law

After analyzing datasets of observed annual land-clearing transitions in the Dry Chaco from Vallejos et al. (2015),<sup>3</sup> Nolte and co-authors claim that deforestation substantially decreased after (and because of) the implementation of the Forest Law around 2009. As indicated in Nolte et al. (2017a), deforestation for the three analyzed provinces indeed decreased over time in terms of hectares deforested. However, this trend started around 2004, well before the passing of the Forest Law in 2007 and the completion of LUP maps around 2009. The reduction in deforestation found afterwards might well be due to a continuing trend. As seen in the trendlines in Fig. 1, this decline is especially noticeable for green zones in the three provinces analyzed. Deforestation in yellow and red zones (medium and high conservation value areas) not only did not drastically decrease after the Forest Law was passed (let alone come to a complete standstill), but continued to occur in all three provinces. In fact, deforestation in yellow zones actually increased in Salta and Chaco, remaining continually much higher than in green zones in Santiago del Estero, as also shown in Fig. 1. Trendlines cover both before and after periods, hence slopes are influenced by both the before and after data.

A different selection of the starting year changes the value of these slopes. Trend analysis of the data using Pearson correlation coefficients (Snedecor and Cochran, 1989) show that there is no clear evidence of a decrease in deforestation in two of the three provinces studied (Salta and Chaco) during the period 2009–2014 (Table 1), but when deforestation data prior to the Forest Law are included in the analysis, the deforestation trend becomes significant in all three provinces. It is also true that there is no statistical evidence of a decrease in deforestation before the implementation of the law (period 2004–2009) for any of the three provinces. A significant deforestation decrease for the three provinces analyzed can only be found by extending the period of analysis to 2004–2014.

The datasets used (from Vallejos et al., 2015:5) included all types of land “transformations”, understood as the “replacement of natural vegetation (forests, grasslands, wetlands, savannas or shrublands) by cultivated pastures or crops”, and not only outright deforestation. For this article, however, we accepted the assumption made by Nolte and co-authors that all land transformations can be equated to deforestation.

### 2.2. A Province With a Substantial Increase in Deforestation Was Omitted

Formosa, a province with extensive Dry Chaco forests in which a substantial increase in deforestation was observed during the time

<sup>1</sup> Newspaper Página12, Buenos Aires, 26 July 2017 (available at: <https://www.pagina12.com.ar/52451-donde-pasa-no-crece-mas-el-verde>). Last accessed 26 July 2017.

<sup>2</sup> Newspaper La Nación, Buenos Aires, 26 July 2017 (available at: <http://www.lanacion.com.ar/2047160-greenpeace-denuncia-desmontes-ilegales-en-el-norte-argentino>). Last accessed 26 July 2017.

<sup>3</sup> Original datasets used can be downloaded at: <http://monitoreodesmonte.com.ar/descargas> (Last accessed 26 July 2017).

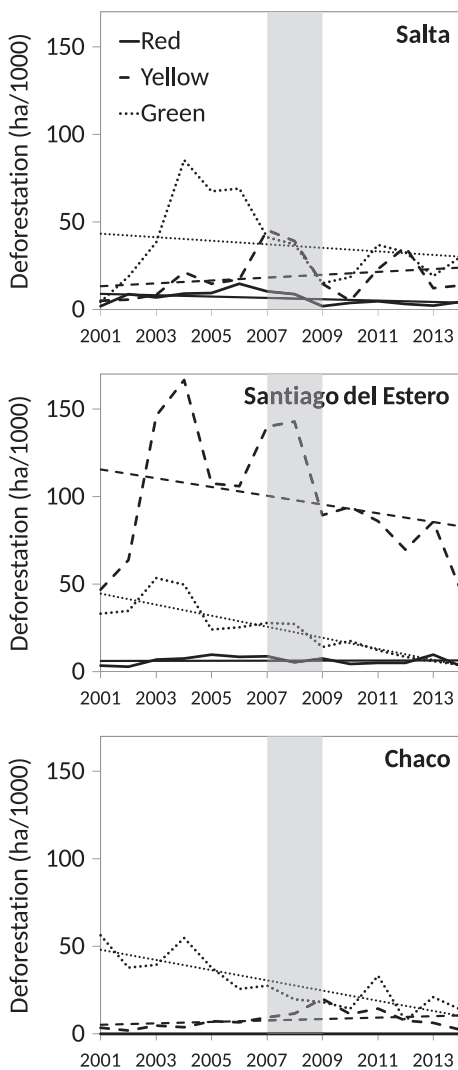


Fig. 1. Total deforestation in different land use categories in three provinces of the Argentinian Chaco region built with the same data used by Nolte et al. (2017a) in their Fig. 2 (page 34). Trendlines added for each category. Gray areas show approximate planning periods at the provincial level after the approval of the national Forest Law.

Table 1

Pearson coefficients of deforestation trends in three provinces of the Argentinian Chaco region. Degrees of freedom for periods 2009–2014, 2004–2009, and 2004–2014 were 4, 4, and 9, respectively. All conservation categories (red, yellow, and green zones) were considered. Coefficients calculated with the datasets used in Vallejos et al. (2015).

Province	Period		
	2009–2014	2004–2009	2004–2014
Santiago del Estero	-0.868*	-0.626	-0.874*
Salta	0.058	-0.509	-0.736*
Chaco	-0.505	-0.699	-0.676*

\* Significant at the 0.05 level.

period under consideration, was omitted in the analysis. Thus, the overall results obtained by Nolte and co-authors suffer from selection bias. Differences in deforestation regulations between administrative units encourage large-scale producers to move across municipalities, provinces or even nations, counteracting the potential benefits of isolated policy efforts and calling for better harmonization across regions, as discussed in similar cases by le Polain de Waroux et al. (2016). In this context, the province of Formosa, also part of the Argentinian Chaco region and the third province most affected by deforestation in recent

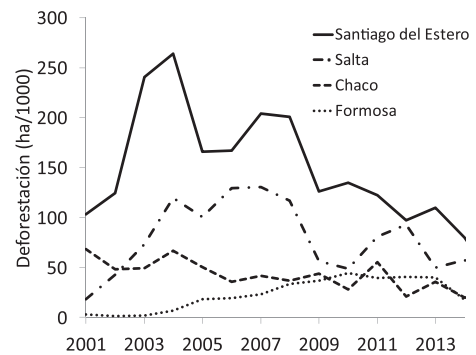


Fig. 2. Deforestation in the Dry Chaco region in four Argentinian provinces.

years (MAyDS, 2017), should not have been left out of the analysis. As seen in Fig. 2,<sup>4</sup> more hectares were deforested in this province than in the province of Chaco in 2010, 2012, and 2013. Formosa should have been included if only because deforestation in this province was more than three times (3.24) higher after the passing of the Forest Law (years 2008–2014) than before (years 2001–2007). The LUP map passed in Formosa contained proportionally much more green zones than in the other three provinces (Nolte et al., 2017b). It may have been designed this way so as to attract at least part of the agricultural investments originally intended for the other provinces.

### 2.3. Only Part of One Ecoregion Was Taken Into Account in the Analysis

Only part of one ecoregion (the Dry Chaco) was taken into consideration in the study, ignoring deforestation and land use changes in other ecoregions and types of forests covered by the Forest Law. Nolte and co-authors draw conclusions on subnational policies analyzing only the Dry Chaco in the provinces studied, whereas the Forest law does not make distinctions between types of forests or ecoregions. For this reason, conclusions drawn for the province of Chaco are questionable, since no information is provided about what happened in the so-called “Wet Chaco” area within this province, which contains about half of the forests in that province. The same criticism applies for the “Yungas” forests in the province of Salta, which has also not been included in this study. If all ecoregions are taken into account, Formosa becomes the third most deforested province of the entire Chaco region of Argentina (MAyDS, 2017).

### 2.4. Deforestation Percentage by Conservation Categories Is Better Than Hectares by Province as an Indicator of Law Enforcement

In our view, no “rigorous empirical evidence” was actually found by Nolte and co-authors to support the assertion that “large-scale deforestation in major agricultural frontiers can be slowed down by subnational policy within a national framework that prescribes processes, but not outcomes” (Nolte et al., 2017a: 38). Even though one of the objectives of the Forest Law was “to regulate and control the reduction of native forests aiming to reach a sustainable area”, it imposed no quantitative reduction target for deforestation. The law intended to reach its objective by concentrating deforestation in specific zones where native forests were considered to be of “low conservation value” (green zones). The total area that could be subject to deforestation, without any time constraints whatsoever, was therefore the entire green zone defined by each provincial government. For this reason, the potential of the law to reduce the overall deforestation rate was arguably rather limited. The “success” of the law, or the capacity of provincial governments to enforce it, for that matter, should better (or should

<sup>4</sup> Data from: [http://geonode.geosalta.inta.gob.ar/layers/geonode%3Acoleccion\\_4\\_0\\_argentina\\_1976\\_2015\\_wgs84](http://geonode.geosalta.inta.gob.ar/layers/geonode%3Acoleccion_4_0_argentina_1976_2015_wgs84). Last accessed 19 April 2017.

only) be assessed in terms of reductions in deforestation in explicitly protected zones (those classified as yellow and red) rather than in zones assigned to agriculture production (green). In essence, since deforestation became prohibited in yellow and red protected zones, ideally it should have moved to zero in those zones immediately after the law was implemented by each province. Any value different from zero could *senso stricto* be interpreted as a failure of provincial administrations to enforce the law since zones categorized as green in all provinces were more than enough to maintain or even increase deforestation rates incurred in the years previous to the discussions leading to the Forest Law. It could even be argued that a concomitant increase in deforestation of green zones could be an indication of the effective enforcement of the law in protected zones. Regardless of any counterfactual evidence found that deforestation decreased more after the implementation of the Forest Law than before, the bottom line is that anything more than zero deforestation in yellow and red zones can be interpreted as a failure of provincial governments to enforce this law. As follows, it can be argued that the *percentage* of deforestation (calculated as [area deforested ÷ area of remaining forests] \* 100) in different conservation categories (red, yellow and green zones) better reflects the effective enforcement of the Forest Law than the overall deforested area per zone or across all zones. As shown in Fig. 3, after the passing of the Forest Law, aggregate deforestation for the three provinces' protected zones (yellow + red) remained higher than in non-protected zones (green), suggesting that provincial administrations failed to enforce the mandate of this law and their own LUP laws. An analysis of proportional deforestation per province reveals details and trends that are not detectable in Fig. 1 using hectares. In Salta, for instance, the LUP map was approved in 2009 (see arrow “a” in Fig. 4, top panel) and, as expected, one year after that, deforestation substantially decreased in yellow zones (Fig. 4, top panel, arrow “b”). However, as discussed extensively elsewhere (Seghezzo et al., 2011), this reduction was first and foremost the result of the intervention of the National Supreme Court of Justice in a case filed against the provincial and national governments by indigenous communities.

The Court ruling provisionally suspended deforestation in a large part of the provincial territory, most of it categorized as medium conservation value (yellow). When the Court lifted the deforestation ban in 2011, deforestation in yellow zones bounced back to the point that in 2012 it was higher than before the map was approved and even higher than in green zones (Fig. 4, top panel, arrow “c”). In 2014, seven years after the passing of the Forest Law and five years after the approval of the LUP map, about 30% and 10% of the deforestation in Salta still occurred in yellow and red zones, respectively (arrows “d” and “e” in Fig. 4, top panel). In Santiago del Estero, the proportion of deforestation in yellow zones increased steadily throughout the entire period, both before and after the passing of the Forest Law (Fig. 4, middle panel). In Chaco, the situation looks similar to that in Salta. Deforestation in different zones fluctuates after the passing of the Forest Law, with a

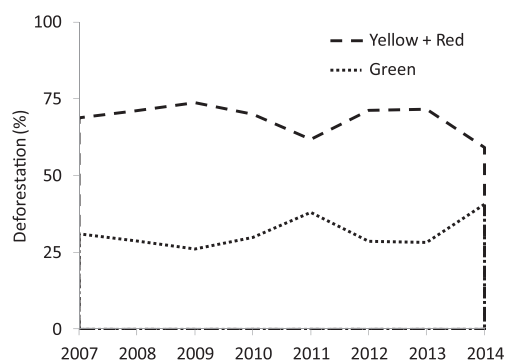


Fig. 3. Aggregate percentage of deforestation in protected (yellow + red) and non-protected (green) zones in Salta, Santiago del Estero, and Chaco.

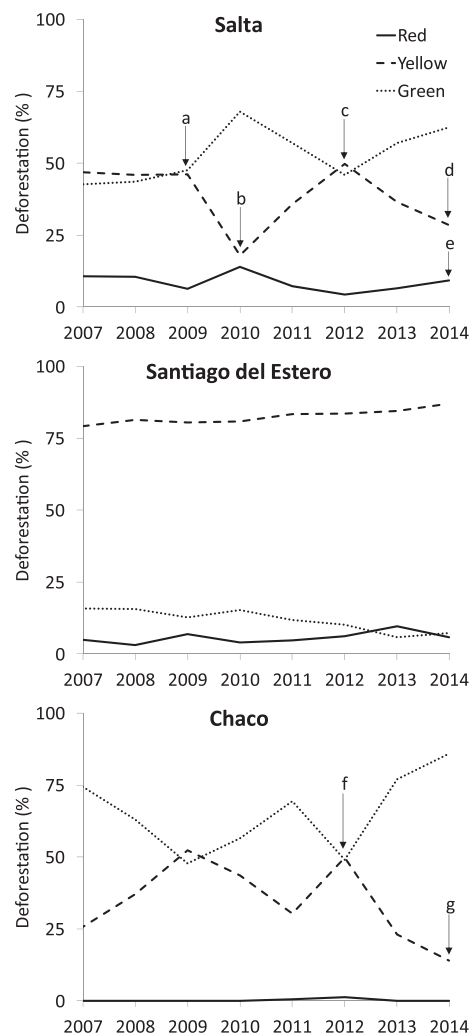


Fig. 4. Deforestation in different land use categories from 2007 to 2014. a: approval of the land use planning map in 2009; b: deforestation decrease mainly due to a judicial ruling; c: deforestation increase after the ruling was lifted; d: deforestation in yellow zone (30% of provincial total); e: deforestation in red zone (10% of provincial total); f: deforestation peak in yellow zone; g: deforestation in yellow zone (15% of provincial total).

noticeable peak in the yellow zone in 2012 (Fig. 4, bottom panel, arrow “f”). Peaks like this are at odds with the assumption that the Forest Law was adequately enforced at the provincial level. As in Salta, deforestation of yellow zones in Chaco is still unacceptably high in 2014 (about 15% of all deforestation) (Fig. 4, bottom panel, arrow “g”).

When analyzed in this way, the statement by Nolte et al. (2017a:37) that “the inhibitory effect of yellow zones [on deforestation] appears particularly consistent” across provinces, does not seem to be supported by the data. Neither can it be concluded that “land use plans adopted by Salta, Santiago del Estero, and Chaco effectively reduced deforestation”, given that the deforestation percentage by conservation category tells a different story than the deforestation hectares by province in Nolte et al. (2017a).

### 2.5. Assigning Zones to Land Units Prior to Land Use Planning Processes Is Questionable

The evidence found by Nolte and co-authors to support their claim that subnational policy can reduce deforestation comes from a questionable reconstruction of conservation zones based on a set of environmental and technical criteria that differ significantly from those established in the Forest Law. As concluded in Volante et al. (2016), the influence of environmental variables on the geographical location of



new agricultural areas has become less and less important over time, since deforestation has been increasingly driven by the proximity to previously deforested areas. Zoning land units prior to actual land use planning processes is a risky and therefore questionable method in itself. Before doing their analysis, Nolte and co-authors transformed original data and LUP maps by means of a procedure that is prone to misrepresentation of the reality on the ground. Entire cadastral units were assigned land use categories (colors) for the years before the passing of the Forest Law by “ascribing categories as a function of the zone that covers the majority of the property’s remaining forest” (Nolte et al., 2017a:32). Our contention is that assignment of land use zones to any time before the passing of the law using a technical procedure ignores the fact that LUP maps are not the outcome of a systematic application of technical criteria, but a social construction and the result of complex and controversial political processes. Decision-making during these processes is highly contingent upon geographical, historical, and social contexts. Therefore, it is difficult to speculate on the zoning that could have been assigned in the past to, for instance, already deforested areas. The comparison made by Nolte and co-authors of the same green, yellow and red land units before and after the LUP process is a circular argumentation since they acknowledge that categorization of land into different colors was already biased towards assigning yellow and red categories to land that was less threatened by agricultural expansion. It is apparent then that governments did little to alter previous deforestation trends and, for that reason, the detection of lower deforestation figures in zones that are theoretically less valuable for agricultural production seems to be due more to reverse causality rather than to a public planning success. Again, regardless of any counterfactual evidence found, what we emphatically rebut here is the alleged causal relationship between deforestation trends and decisions made by sub-national administrations.

### 3. Discussion

As indicated by Nolte et al. (2017a: 38), they did not “explicitly consider the role of indigenous and local forest users in resisting the expansion of commercial agriculture in the region.” Yet deforestation in the Chaco region have been affected, to different degrees, by the advocacy and lobbying from indigenous communities, small scale agricultural producers, NGOs, scholars, and other actors. Had these actors not raised their concerns and openly voiced their opinions before, during, and after the passing of the Forest Law and related provincial legislation, the situation would have been much worse than it actually was in terms of areas deforested and communities affected. Therefore, a certain degree of deforestation reduction needs to be associated with social resistance. Sadly, government officials in at least one province took advantage of the overall message contained in Nolte et al. (2017a) to publicly justify their past and present policies with respect to deforestation and related law enforcement.<sup>5,6</sup> This undermines efforts by activists, journalists, scholars, and other actors on the ground who do not see much political will on the part of the government to effectively curb deforestation.<sup>7,8</sup> A contextualized, place-based political ecology analysis could be of much more help in these complex social-ecological

<sup>5</sup> Newspaper Cuarto Poder, Salta, 1 April 2017 (available at: <http://www.cuartopodersalta.com.ar/se-disciplina-a-las-cachetadas/>). Last accessed 23 May 2017.

<sup>6</sup> Newspaper Qué Pasa Salta, Salta, 2 April 2017 (available at: [http://www.quepasasalta.com.ar/noticias/politica\\_1/en-un-ano-los-desmontes-ilegales-se-redujeron-casi-un-60-en-salta\\_172068](http://www.quepasasalta.com.ar/noticias/politica_1/en-un-ano-los-desmontes-ilegales-se-redujeron-casi-un-60-en-salta_172068)). Last accessed 23 May 2017.

<sup>7</sup> Report denouncing lack of effective policies at: <http://www.greenpeace.org/argentina/es/informes/informe-desmante-sa-tres/>. Last accessed 23 May 2017. Article denouncing complicity of provincial governments with illegal deforestation: <http://www.greenpeace.org/argentina/es/noticias/Greenpeace-Proteger-los-bosques-no-es-una-utopia-es-una-obligacion/>.

<sup>8</sup> Newspaper La Nación, Buenos Aires, 4 July 2014 (available at: <http://blogs.lanacion.com.ar/ecologico/desarrollo-sustentable/salta-sigue-violando-la-ley-de-bosques/>). Last accessed 23 May 2017.

systems in order to avoid oversimplifications of governance processes and prevent misuse of scientific findings and debates by groups with vested interests.

As shown in this paper, a different interpretation of the data used by Nolte and co-authors suggests that provincial governments were apparently unable to adequately enforce the mandate of the Forest Law and their own LUP maps, since deforestation in protected yellow and red zones continued apparently unhindered other than by economic or social variables. Nolte et al., 2017a: 37) are quick to note that this reduction is only happening “over counterfactual scenarios” and only “in some time periods”, explanations that are debatable when assessing the effect of a relatively constant situation such as the enforcement of a specific law. Moreover, absolute deforestation figures overestimate the decreasing trend, and a better metric would be deforestation “rates”, namely deforestation as a proportion of the area of forests remaining in each province. Ascribing the decline of deforestation to a single driver such as law enforcement is highly simplistic, since a multiplicity of factors (such as prices of international commodities, political aspects, spatial constraints, judiciary interventions, export regulations, exchange rates, and the level of taxation of agricultural products, among others) also play important roles in different places or at different times. Similar studies in Brazil, for instance, have also cast doubts on the role of government policies and land use regulations on the spatial expansion of soybean production, since other factors such as local variations in supply chains and transportation costs seemed more relevant (Garrett et al., 2013). It has also been found that the effect of regulations, strict or otherwise, on the rate of deforestation is actually limited and often counteracted by other spatial or biological variables (le Polain de Waroux et al., 2016; Volante et al., 2016). A recent study by the World Bank highlighted the economic and social impacts of export constraints on the dynamics of the agricultural sector (Nogués, 2015). As pointed out in this study, falling international prices and the steady decrease of the real effective exchange rate observed in Argentina since 2002 has clearly affected the growth of the agricultural sector.

### 4. Conclusions

In general, we can conclude that declining deforestation trends in the Argentinian Chaco region cannot be directly attributed to law enforcement by subnational administrations. By analyzing the same data used by Nolte and co-authors, we conclude that declining deforestation trends in the provinces studied (Salta, Santiago del Estero, and Chaco) started before the passing of the Forest Law and cannot be directly ascribed to its efficient enforcement. By looking at the percentage of deforestation in zones with different conservation values, it also seems clear that provincial governments were actually unable to appropriately enforce the Forest Law since deforestation in protected zones continued or even increased after its passing in 2007 and even after LUP maps were approved around 2009. The use of incomplete datasets by Nolte and co-authors is affected by selection bias and the procedure of assigning conservation categories (zones) to land units prior to the give and take of land use planning is questionable. Overly technical data processing and biased selection of specific datasets may lead to erroneous and even misleading conclusions. Land use planning is strongly affected by social and political factors that should not be ignored by scholars intending to contribute to more sustainable and equitable land use in agricultural frontiers. Scholars all over the world are concerned about the social and environmental consequences of deforestation and land use change, yet we should not be so caught up in our desire to see improvements on the ground that we can't see the forest for the trees.

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