Beyond the Panacea: a Critical Assessment of Instruments of Deforestation Control

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Since the late 1980s the Brazilian government has adopted various instruments aimed at controlling deforestation in the Amazon. Despite marked differences from a conceptual and practical perspective, when these instruments were introduced, the government often considered them to be effective and inherently superior solutions to those previously used to control deforestation. In this article we shall assess these instruments critically, to emphasise their results, potential and limitations.

This analysis is based on 84 interviews and extensive direct observations of the procedures conducted by different Brazilian government entities between June 2007 and July 2009. In addition to qualitative data, this study also drew on quantitative geographical data provided by INPE (the National Institute for Space Research), IBAMA (the Brazilian Institute of Environment and Renewable Natural Resources) and SEMA-MT (the Secretary of the Environment of the State of Mato Grosso).

The following three sections will present and evaluate institutional, economic as well as command and control instruments, respectively. The final section will highlight the need to use these tools in an integrated fashion, to unite their strengths and mitigate the weaknesses of each type of deforestation control modality.

Command and control instruments

Command and control instruments are undoubtedly the most widely used environmental governance modality in the Amazon. In addition to serving as guiding principles for IBAMA's activities since the institution was created, the instruments were also adopted by various environmental agencies at the state level (Órgãos Estaduais do Meio Ambiente—OEMAs). A mechanism is considered a command and control mechanism when the government first 'commands' the development of a given environmental law and then 'controls' its enforcement through inspection activities (Stewart, 1996). Although widely used for controlling deforestation in the Amazon since the Programa Nossa Natureza ('Our Nature Programme') in 1988, it was not until the 2000s that these instruments reached the scale needed to produce an effect on reducing deforestation (Mello, 2006).

The hiring of additional IBAMA personnel in the form of environmental analysts with university degrees—and the creation of DETER (a real-time deforestation detection system), by INPE, played a key role on this front (Rajão and Vurdubakis, 2013).

According to INPE data, the period between 2004 and 2012 registered an 83 per cent decrease in Amazon deforestation. Although this decline occurred concomitantly with two editions of the Plan for the Prevention and Control of Deforestation in the Legal Amazon area (PPCDAm), it has not yet been possible to determine the precise role played by that policy in the decline of deforestation. In any case, the preliminary results of our study of the impact of IBAMA's actions on the decline in deforestation showed a statistically significant correlation between the number of fines levied by IBAMA in a given municipality and the decline in deforestation in that same location in the following year.

Despite these positive results, it is important to highlight the financial and regulatory limitations of command and control instruments in the region. From a financial standpoint, IBAMA's enforcement actions carry a high operational cost and rely on the skills of inspectors to be effective and successful (Rajão and Vurdubakis, 2013). For example, we may consider the total number of infraction notices issued by IBAMA across the country between 2004 and 2007 and the budget spent by the institute to develop a rough indicator. This amounts to BRL204,805 (about USD90,000) per infraction notice (IBAMA, 2008). Although this amount is just an approximation and does not include other activities carried out by IBAMA (e.g. licensing, environmental education etc.), the magnitude of this figure suggests that command and control actions do indeed entail high transaction costs.

Consequently, any attempt to expand these activities will meet budget and infrastructure constraints and will be hampered by the inability of inspection bodies to cover the entire territory. For example, the sum of all areas fined by IBAMA for illegal deforestation amounts to only 17.21 per cent of the total area deforested between 2004 and 2008. Given that only a small fraction of offenders eventually suffer sanctions, inspection activities are seen by fined farmers as arbitrary and unfair. This means that the command and control instruments come into conflict with the notions of justice and fairness considered central to enabling modern forms of governance (Foucault, 1977; Weber, 1922/1968).

Furthermore, since the amount of people fined is very low, the deterrence effect this action should have does not manifest itself satisfactorily. Thus, it is unfeasible to promote a legitimate and stable order in Amazon land management based solely on command and control.

Institutional instruments

Institutional instruments constitute another branch of environmental governance mechanisms widely discussed in the context of the Amazon. This type of instrument has a broad definition that often overlaps with command and control as well as economic mechanisms. Despite this challenge, we can characterise institutional mechanisms as a typology of environmental governance conducted through a set of rules and political and administrative structures that indirectly contribute to policy objectives. As such, while command and control mechanisms directly enforce

environmental laws and punish those who disobey them a posteriori, institutional mechanisms try to offer a legal and administrative context to encourage compliance with the law, to avoid fines before they are imposed. Examples of such mechanisms in the context of the Amazon include land regulation programmes (e.g. Terra Legal, Decree 6992/2009), socio-economic environmental zoning (Ab'Saber, 1989) and the establishment of special protection areas, such as indigenous, extractive and environmental conservation reserves.

The creation of protected areas was undoubtedly one of the most effective measures to control deforestation in the last decade (Nepstad *et al*., 2006). Regarded as one of the main pillars of the PPCDAm, a sizeable number of protected areas were created by the government between 2004 and 2009, covering 54 per cent of remaining Amazon rainforests. Consequently, Soares-Filho *et al*. (2010) estimate that the creation of protected areas accounted for 37 per cent of the reduction in deforestation witnessed between 2004 and 2006.

Environmental licensing and registration are other types of institutional instruments used widely in the Amazon in recent years. These tools are based on geo-referencing and the use of satellite imagery to determine the environmental status of rural holdings. Using these records, government control entities are expected to carry out farm inspections using satellite images and to hold offenders accountable for environmental crimes.

Conceptually, environmental licensing and registration instruments can be considered ideal forms of social control, due to their potential to carry out inspections that are both universal (i.e. everyone in the system may be subjected to it) and have low transaction costs (i.e. the use of satellite imagery abolishes the need for on-site visits when issuing notices for illegal deforestation activities). As such, these systems could, theoretically, provide a foundation for the development of a disciplinary type of environmental governance—they are, therefore, seen by the population as modern and legitimate systems (Foucault, 1977).

However, an analysis of the effectiveness of the licensing system for rural properties (SLAPR) in the state of Mato Grosso has shown that these objectives are not always achieved. In particular, a comparison between deforestation inside and outside the system suggests that this instrument has contributed to increasing—rather than decreasing—deforestation within licensed properties.

One of the reasons for this may be the registration strategy, which leaves it up to owners to choose which properties will be included in the system, leading to the exclusion of properties with environmental liabilities and the inclusion

Photo: UNDP Brazil. Aripuana River, Northwestern Mato Grosso.

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of properties with vegetation coverage, for purposes of obtaining deforestation approval. Moreover, the state agency has not systematically used the ability to remotely control deforestation throughout the duration of the study. (Rajão, Azevedo and Stabile, 2012).

Economic instruments

Finally, the third type of mechanism is characterised by encouraging environmentally sustainable behaviours by providing positive incentives, usually of a financial nature (Juras and de Araújo, 2008).

Some of the policies that use economic mechanisms are: the ecological ICMS, which transfers funds to municipalities according to ecological indicators (Ring, 2008); the clean development mechanisms (CDMs), created by the Quito Protocol of 1997 (Austin *et al*., 1999); carbon credit for reducing emissions from deforestation and forest degradation—commonly known as the UN-REDD;[3] and incentive programmes for sustainable production (Le Tourneau and Greissing, 2010; Lederer, 2011).

These mechanisms are based on the notion that economic players who deliberately decide to reduce their environmental impact should be financially compensated, directly and indirectly (Fearnside, 1997; Kaimowitz, 2008; Olsen, 2007).

Such cases can already be found in existing literature, where economic incentives to sustainable development have become viable and long-term alternatives for local populations (Le Tourneau and Greissing, 2010). For example, the Project for Conservation and Sustainable Use of Forests in North-western Mato Grosso (the UNDP/GEF project) showcases the multiplying nature of these initiatives, which bring together an increasing number of local stakeholders and disseminate sustainable economic practices related to the extraction of latex and Brazil nuts (Tito, Nunes and Vivan, 2011).[4] However, two important limitations of these initiatives are their relatively small scale and the pressure put on these areas by domestic and international markets to increase the production of, mostly, beef and soybeans—which, historically, have been linked to deforestation (Hargrave and Kis-Katos, 2013). In this context, REDD was seen by several stakeholders as a way to obtain enough funding to offset these economic pressures and encourage the preservation of the forests (Kaimowitz, 2008; Nepstad *et al*., 2009.).

However, expectations of receiving large amounts of funds through REDD have not yet materialised. Several factors could explain the difficulties faced by REDD, the most apparent of which is the lack of consensus within the several Conferences of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC) about the mechanism and the financial crisis in Europe and the United States.

There are also internal inconsistencies within the mechanism—while some players see REDD as an economically efficient market instrument, others see it as a government policy detached from the market. Furthermore, there are profound differences in issues related to the methodology used in monitoring and calculating credits and in fund allocation, and well as in the protection of biodiversity and indigenous rights (IPAM, 2011).

Even within existing REDD projects related to the voluntary carbon market there are problems in the criteria used to calculate the credits, since the future baseline methodology used by such projects tends to project future deforestation levels well above historical figures, to achieve a higher level of 'avoided' deforestation and, consequently, increase profits from the sale of credits (Lang, 2013; Leach and Scoones, 2013). In addition, current models do not consider the fact that deforestation trajectories can change dramatically according to national and international contexts (Soares-Filho, Lima, Bowman and Viana, 2012).

These methodological controversies are compounded by the emergence of local movements against REDD, reflecting the existence of deeper concerns about the negative consequences of this mechanism, such as increased social inequality, for example (Arsel and Büscher, 2012).

Final thoughts

In short, all of the deforestation control instruments currently enacted—to a greater or lesser extent—by the Brazilian government have their limitations. In particular, we have seen that when command and control instruments are scaled up, they quickly run into logistical, financial and legitimacy limitations. Similarly, institutional instruments cannot, by themselves, bring about behavioural changes—and can even be used for adverse purposes.

Despite being greatly emphasised in recent years, economic instruments have had trouble expanding their local sustainable development activities to regional levels and securing substantial financial resources—from REDD or other mechanisms.

On the other hand, each of these instruments also has its strengths, and they have been key in bringing about positive advances. For example, IBAMA's inspection activities have had a significant effect on the decline of deforestation. Likewise, the creation of protected areas has contributed to curbing deforestation by creating obstacles to the possession of public lands without a clearly defined purpose. Moreover, local projects to promote the production of latex and Brazil nuts, even on a small scale, have made it possible to combine a higher income and better quality of life within environmental conservation activities.

As such, by combining different approaches to controlling deforestation one can arrive at a "policy mix" where the weaknesses of the different instruments can be mitigated, thus building synergies. Particularly, a reduction in the opportunity cost of environmental preservation can also be observed in areas with effective command and control structures. Similarly, even though the licensing of rural properties has not had the expected effect, these records facilitate inspection work and lower the transaction costs of enforcement.

Finally, the existence of economically viable alternatives to deforestation—along with improved command and control policies—changes the risk–reward relationship of environmental crimes and contributes to the establishment of sustainable practices. This analysis suggests that the search for an "optimal" solution to deforestation is an ambition doomed to fail. Therefore, one must adopt a comprehensive strategy that takes into account the need to integrate a heterogeneous set of public policies. ■

Photo: Laercio Miranda. Village of Barranco Vermelho, Erikbaktsa Indigenous Lands; Brazil Nuts Integrated Programme (PIC). Experience interchange meeting.

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3. The United Nations Reducing Emissions from Deforestation and Forest Degradation (REDD) is an initiative to produce a financial value for the carbon that is stored in forests by providing incentives for countries to reduce emissions from forested areas and to invest in low-carbon pathways of development.

4. Also see Vivan *et al*. in this issue.