Madison in the Forest:

Federalism and the Management of Renewable Natural Resources

Conservationists, biologists, ecologists and economists accept that some natural resources require a proactive approach to management in order to render them viable in the future. Yet sustainability is a political choice, at the local and the national level, particularly given the opportunity costs associated with managing a natural resource for long term viability. Elinor Ostrom received the Nobel Prize for her work concerning the importance of tailoring local institutional design and property rights regimes to match the dynamic incentives for common pool natural resource usage to minimize the likelihood of depletion. It is equally important to consider the incentive structure of institutional design at the national level for sustainably managing such types of natural resources. Specifically, are federalist nations more likely to create incentive structures that encourage the sustainable management than unitary states?

I aim to demonstrate that under certain conditions, a federal system can exacerbate tendencies to overexploit natural resources that are randomly distributed *ceteris paribus* because there are less likely to be institutional guarantees of revenue redistribution. If, consequently, we expect that unitary states are more likely to manage their resources in a more sustainable manner, then why do we see unitary states still shirking on international commitments to manage their natural resources such as forests sustainably? In the unitary state of the Republic of Congo, it may be helpful to view foreign investment enclaves in the form of timber concessions as states in a de facto *quasi-federation*, in order to understand pitfalls of the concessionary arrangement that dominates forest management, and as well as to provide some preliminary evidence of the aforementioned theory.
The paper proceeds as follows. First I discuss the literary tradition in which my question is situated. I then discuss the mathematical intuitions for understanding why, under certain specified conditions, federal institutions can lead to higher rates of natural resource exploitation in comparison to unitary states, *ceteris paribus*. I extend the implications of this proto-theory to the case of the Republic of Congo, where I argue that a *de facto quasi-federation* shaped by foreign investment enclaves in the form of forest concessions is important for understanding why deforestation is exceeding a sustainable rate in some regions of the country, and thus for the country overall.

**Review of Relevant Literature**

In the field of political science, literature concerning the management of sustainable natural resources has focused largely on property rights regimes, institutional solutions for common pool resources, and the effects of decentralization for resource management. The most prominent work on institutional design for natural resource management is that of Elinor Ostrom. She focuses on tailoring institutional designs to specific natural resource systems, observing that decision-making occurs at three levels: operational, collective choice, and constitutional. Operational level property rights include access and withdrawal rights, while collective choice property rights include management, exclusion, and alienation. Such questions concerning the design of institutions for sustainable natural resource management have often focused on decentralization at the local level. Specifically, Ostrom (1992), Agrawal (2001), Andersson et al. (2004) and Ribot (1999) have considered the tradeoffs in empowering local resource users with decision-making authority over the rights and rules governing the use of these resources.
However to extrapolate from these authors to the question of how federal institutions might affect incentives for sustainable resource management is not an entirely consistent progression. First of all, the common conflation of common property resources with state owned resources as Ostrom (1992) points out has implications for how we think about institutions best designed to manage those resources. Consequently, institutional designs for the sustainable management of state owned resources are likely to be different from institutional designs for the sustainable management of resources owned by a local community of users, but substantively and with regard to the level of analysis. Decentralization often refers to devolution of ownership rights to local communities, not necessarily to political actors. As the question at hand is not about participatory government and does not necessarily depend on an assumption of democratic accountability, discussions of decentralization of forest management to local communities does not get at the institutional design at the constitutional level, thus limiting the potential utility of viewing concessionary forest management in this light.

The literature on federalism does not address the effects of federal institutions, described as such, on sustainable resource management. However, perhaps most relevant to my endeavor is Treisman’s analysis of the effects of decentralization on the success of economic reforms. He characterizes decentralization as “the extent to which sub-national offices have autonomous bases of power or depend on central politicians”¹, a perhaps more simplified but more relevant definition for the question of federations and natural resources. He suggests that economic policy reforms are less successful in federal states, and that targeting transfers and redistribution is more costly politically and less economically efficient. It is unclear exactly whether the expected differences in the effects of economic reforms in federal versus unitary states are attributable to

---

the extraction and allocation of revenues of natural resources, but the conclusion that different
incentives for distribution of economic resources exist in more decentralized regions than in
centralized regions given heterogeneity among these regions provides underlying motivation for
this paper.

Scholarly discussions of the constitutionally designated division of authority with respect
to natural resource management do not yet appear to have been addressed. Agrawal (2005)
discusses the potential for creating “environmental subjects” through local involvement in the
practices of monitoring, rule making and management. Agrawal considers environmental
subjects are individuals who value the environment and the viability of natural resources and are
willing to expend effort to sustainably manage them. However, in the case of state ownership of
natural resources, the creation of environmental subjects at higher levels of authority where there
is minimal engagement with local institutional arrangements for natural resource use seems less
likely.

With regard to the case of forest resource management particularly in the Congo basin,
the World Resources Institute has commissioned several working papers analyzing the nature of
forest management and governance in the region. Rebecca Hardin (2002) discusses the history
of concessionary politics in the Congo basin with respect to how such politics have shaped
relationships between state actors, patrons, and local communities. Benjamin Singer has
conceived of several models of concessionary politics in which concessionaires vary in their
degree of development projects and provision of goods and services. He discusses a
“concessionaire-as-state” model, a conceptual framework similar to what I utilize here. These
works provide helpful background information concerning the politics of concessions in the
Congo Basin, and can support attempts to derive theoretical implications for the geopolitical arrangements of forest concessions in Congo.

While the role of decentralization in the management of natural resources has been explored at length, thus far, it does not appear that the effects of a federal institutional design on sustainable natural resource management have yet been examined. I endeavor to begin to consider this here, with the hope that further theoretical and empirical research will result.

I. A Basic Mathematical Intuition of Implications of Federalism for Sustainable Resource Management

A federal institutional design in which states retain authority over the collection and allocation of resources and revenues can create incentives for state officials to exploit resources in the most lucrative, and potentially unsustainable fashion, given certain assumptions. State officials act, in this case, not unlike the individual agent of extraction (the logger, miner, etc) whose preference is to maximize his revenue through maximizing exploitation volume while minimizing cost of extraction. The state politician has a utility function of natural resource extraction that may be based on two types of benefits: revenues and political capital. Political capital might be derived from the number of jobs he can create through resource exploitation and ancillary project development, associated revenues, support gained from redirecting funds to the community. Political capital is in large part of a function of electoral accountability, and for the case of this paper I limit my focus on the revenue maximizing component, since discussions of electoral accountability constrain the analysis to those states which are relatively democratic.

---

2 A federal arrangement refers to the institutional structure in which there are two level so of authority: a central federal author and territorially bounded state authorities, each of which retain exclusive authority over at least one policy domain.
The central dilemma in managing natural resources is akin to that described in Prescott and Kydland’s (1977) discussion of the time inconsistency problem in the context of inflation and unemployment. The general argument conveys that policies initiated by political actors based on current preferences may not be consistent for fulfilling those same preferences in the long term. In the case of managing a natural resource such as forests, which may on average require 30 years for regeneration, the time horizon for state level politicians is not sufficiently long to incentivize the sustainable management of the forests purely on the grounds of economic returns. As commonly discussed in political economy literature, this time inconsistency problem in which the best action pursued at any given time does not maximize the social objective function undermines the ability of local politicians to credibly commit to long term policy goals. The incentives to pursue immediate payoffs are further supported in federal systems in which states may receive block grants and transfers from the central government. This is because even in the instance that social utility maximization does not occur that far into the future, state politicians will wish to maximize current returns at the expense of social utility in the future because of the possibility the costs of overexploitation are mitigated by the option of federal transfers. However, in federations that cannot guarantee interstate transfers or a significant degree of redistribution among states by the federal government we might expect to see a different set of incentives at work.

Ceteris paribus, federal institutions can actually exacerbate the tendency to overexploit natural resources under specified conditions that are common to developing countries. Suppose country C is endowed with some natural resource R which is randomly distributed over states S_A and S_B that are equal in the following characteristics: revenue resource portfolio, demand for goods and services, and bureaucratic capacity. Let us assume that politicians in S_A and S_B can
set the actual exploitation rate of \( R \), \( r \) through choosing to enforce a given rate of exploitation (fining loggers for overexploiting, monitoring, loggers’ activities, weakening the requirements on logging contracts). Consider some budget \( B \) for each state, unrelated to resource endowment, and thus for the purposes of this argument, equal in both states: \( B_{SA} = B_{SB} \). While this assumption may be unrealistic, we may assume that the budgetary constraint is not directly related to the spatial distribution of resources in a systematic way and thus in expectation, we may consider the budgetary constraint in both states to be equal. \( B_S \) may include a federal tax in addition to overhead costs of government and any goods and services it provides. Goods and services provided are likely directly related to revenues (natural resource revenues or tax revenues), but we may presume that the in order to stay in power, the state must provide some minimal level of goods and services, and thus I hold constant the overall combination of goods and services provided and overhead costs. It is often assumed that such politicians are rent-seeking, but for the purposes here I relax this somewhat to suggest that they aim at a minimum to meet the aforementioned budget through their revenue extraction.

Suppose that the random distribution of \( R \) resulted in unequal endowments of \( R \) for each state: \( R_{SA} > R_{SB} \). Let us also assume that other sources of revenue for the state are not sufficient to cover \( B \), and that \( C \) is a country in which there are no interstate transfers and no institutional guarantee of redistribution at the national level for reasons which will become relevant for the case of Congo and de facto federalism.

Now consider that there is some exploitation rate \( r^* \) of \( R \) for country \( C \), at which the resource will be sustainably managed. Thus, \( r^* \) is the rate at which \( C \) can exploit the resource without fully depleting it. The natural resource of interest in this paper is forests, and thus \( r^* \) is the rate at which timber can be harvested such that the rate of exploitation of timber does not
exceed the rate of regeneration. Thus, consider a forest that regenerates under the best
conditions every 30 years. Each year, loggers may be allowed (by way of $S_A$ and $S_B$’s decision
to enforce or not enforce $r^*$) to cut approximately $3.33\%$ of $C$’s total endowment of $R$ to ensure
that there is always timber available to harvest. Additionally, this requirement holds for
individual forests in $C$, so each contiguous forested area (forests may be broken up throughout $C$)
can only be exploited at $r^*$ to be viable.

Given that $R_{SA} > R_{SB}$, then $r^* R_{SA} > r^* R_{SB}$, and consequently, the absolute amount of $R$
exploited is lower in $S_A$ than in $S_B$. If we assume the revenues collected from equal volumes of
resource $R$ are constant, then the revenues, $T$ derived from exploiting $R$ at rate $r^*$ in $S_A$ in any
one year are greater than those derived from exploiting at rate $r^*$ in $S_B$ in any one year.

However, if $B_{SA} = B_{SB}$, then $S_B$ has less revenue to cover its budget than $S_A$. Consequently, $S_B$
has an incentive to overexploit, in order that the revenues it extracts ($T_B$) can cover its
expenditures ($B_B$). Given a federation in which state officials collect and redistribute revenues
with some degree of autonomy, state officials in states with resource endowment under the
national average (and limited diversity in sources of revenue extraction) will try to exploit at
least enough to cover their budget. I conservatively assume that politicians are conservation
oriented – that they wish to exploit other revenue sources before increasing natural resource
extraction to an unsustainable rate. The decision theoretic model can be summarized as follows:

From the following assumptions and conditions:

1. $B_A = B_B$
2. $S_A$ and $S_B$ have the authority to determine $r$, the actual rate of exploitation
3. Neither $S_A$ or $S_B$ has a sufficient source of revenue to cover $B$ without exploiting the
natural resource in question.
4. There is no institutional guarantee of revenue transfer or redistribution between
$S_A$ and $S_B$.
5. $R_{SA} > R_{SB}$
6. \( r^* \) is constant for all \( R \) (forested regions as a whole, and individual forests)

7. \( T \) is a constant function of \( rR \). \( f(rR) = T \) and the revenues derived from the exploitation of \( rR \) each year.

We can conclude that \( S_B \) has an incentive to overexploit if: \( f(r^*R) < B_B \) (i.e. \( r > r^* \)) and \( S_B \) will harvest sustainably if: \( (r^*R) \geq B_B \) (i.e. \( r = r^* \)).

The simple analysis above is time independent, and does not take into consideration how the present value of the revenues derived from resource extraction might compare with the value of future revenues. In order to address how federalist institutions might exacerbate the inconsistency of political and natural resource time horizons, it is important to consider how those setting (or enforcing) exploitation rates discount the value of the resource in the future.

Under the assumptions and conditions specified, there is no institutional guarantee of redistribution. Consequently, \( S_B \) cannot depend on receiving any of the rents produced from extraction in \( S_A \) in order to ensure it has sufficient revenues to cover \( B \). Specifically, \( S_B \) cannot depend on receiving a sufficient amount of revenue through redistribution to cover \( B \). If \( S_A \) and \( S_B \) aim to set \( r \) to produce \( T \) to equal or exceed \( B \), then shortages on \( T \) will force them to value the natural resource at a much higher rate than in the future. The discount rate \( \delta \) for each state will thus depend on whether \( T \) of that state is sufficiently large enough to cover \( B \). Thus if \( B \) is constant, \( \delta \) is inversely related to \( T \), since states with a lower natural resource endowment are less able to meet the requirements of their budget at any given time, and so the present value of the natural resource is significantly higher than its future value. We might write this intuition in the following way:

\[
\lim_{T-B \to \infty} \delta = 0
\]
Consequently, there are implications for the actual rate of extraction in comparison to the sustainable rate of extraction. If $B$ is constant, then as $T$ increases, the likelihood of exploiting at $r > r^*$ decreases:

$$\lim_{\delta \to 0} r = r^*$$

Thus, not all federal systems can guarantee interstate transfers or redistribution of resource rents, and this uncertainty causes discount rates to increase. Hard budget constraints are institutionally guaranteed caps on transfers, constituting one example of a mechanism by which federalism can hinder redistributive policies. In a unitary state, in which the national government has the authority (and bureaucratic capacity) to set and enforce the rate of extraction of forests and redistribute resource based revenues, exploitation is more likely to be sustainable for two reasons: constraints on authority, and revenue redistribution.

Presumably, local officials do not have the authority to set the rate of extraction – the singular source of authority at the national level renders local officials bureaucrats, without the authority to set resource extraction rates (at a sustainable rate or otherwise). However, this explanation has little weight if the incentives to overexploit still exist, since we are still faced with a principle-agent problem. Local officials may still choose to ignore logger transgressions instead of monitoring them and enforcing penalties, which they have the authority (and potentially the capacity) to do.

More importantly, and central to this argument, is that local officials, who constitute the bureaucracy in the context of a unitary state, do not have localized budgetary constraints, and can depend on national allocation of revenues collected from the extraction of resources in other regions with higher natural resource endowment. In much of the literature on federalism, redistributive policies are attributed to the federal government as opposed to the state
government in order to avoid a Tiebout-like citizen sorting and a consequent race to the bottom for policies such as welfare. Because the costs are presumably higher for leaving the country than for moving between states, the federal government is better equipped to redistribute wealth, in the form of revenues which may have been obtained from wealthier regions. However, because the federal government is better suited to redistribute resources does not ensure that all redistributive policies are relegated to the central government, which has been observed and explained in literature on legislative federalism. One might consider as an example a country such as Iraq where ethnic identities are geographically distributed such that they align with concentrations of natural resources. In this case, these regional groups have successfully bargained to retain control of a significant portion of the revenues derived from resources extracted in their region. In a fully unitary state, there is no potential for this kind of bargaining, as all resource derived revenues are collected and potentially redistributed by the center.

This point on redistribution is central: in federal systems in which states face similar budget constraints, bureaucratic capacities, and revenue sources, but varying natural resource revenues, a failure to ensure redistribution of state revenues by the center creates incentives for less endowed states to overexploit. I now turn to a brief case evaluation of forestry management in the Republic of Congo, a heavily forested country in the central African Congo Basin.

II. Forest Concessions in the Republic of Congo:

Foreign investment enclaves as states in a *de-facto quasi-federation*

In comparison to forested countries in the Amazon, the overall rate of deforestation in the Republic of Congo (henceforth Congo) is not relatively high. However, the asymmetric
distribution of resources in the context of territorially defined timber concessions managed by foreign investors has resulted in higher rates of exploitation in regions where forest endowment is comparatively lower, contributing to an overall higher rate of deforestation. Congo is a forested country that matches the distributive specifications of the above model. The forests in Congo are unevenly distributed; the north has a dense, diverse, and contiguous region of forests while the southern portion of Congo is more sparsely forested, with lower levels of biodiversity and the forests are more fractured. While oil has become the primary export commodity since its discovery in the 1970’s, timber has a long history of being the necessary source of revenue for providing a minimum level of public goods and services. I do not explore the interaction between increased dependency on oil and rates of timber extraction here. However, since increased oil revenue should relieve dependence on alternative commodities such as timber, observed variance in rates of timber extraction, specifically over-extraction in the south, suggests that the presence of oil revenues may not affect the dynamics discussed here. Still further research of oil revenues and timber extraction over time could shed light on this relationship.

I suggest that foreign timber investment enclaves resemble states in a quasi-federal state, and the unequal redistribution of resources has resulted in the overexploitation of timber in the less-endowed region. The resources extracted from the forests in Congo are defined by law as the property of the state. However, the forests of Congo Basin countries, including Congo have been characterized by what Rebecca Hardin calls “concessionary politics” since before independence – generally a property rights regime in which foreign investors obtain a contract for the exploitation of wood in a given territorially defined region. She cites two practices involved in Congo’s concessionary politics that shed light on how concessions might resemble states: negotiation at local/regional levels of concessionary rights that have been ceded at the
national level and patron-client relationships that may replace governance by the nation-state.4
Before exploring how the forest concessions in Congo resemble states in a quasi-federation
particularly along these dimensions, I provide brief background on the resource distribution and
relevant geographic boundaries in the Congo.

Background

Congo’s forests extend from the relatively unpopulated north of the country into the more
densely populated regions in the south, though the history and resulting ecology of each region
distinguish the north from the south. Historically, the south has been more heavily exploited, in
large part due to the inaccessibility of the north and the difficulty in transporting timber to the
southern port at Point Noire. Consequently, the current spatial distribution of forest resources in
Congo is asymmetric, with a much higher density and diversity of commercially logged species
in the north than in the south. Additionally, a civil war occurred in the south throughout the
1990’s which threatened or destroyed much of the infrastructure for timber exploitation
operations in the south of the country and all but one of the European timber companies
operating there at the time. Since 2000, Asia (primarily China and Malaysia) has become the
primary source of foreign investment in the timber sector in the region.

There are three types of territorial and administrative divisions within Congo that provide
the relevant landscape for the management of forestry resources in Congo. First, Congo has ten
administrative zones which act as administrative units for the central government in Brazzaville.
Secondly, the forests designated by the state (who constitutionally owns all forest products) for
current or future exploitation are Forest Exploitation Units (UFE’s). Similar boundaries were

4 Hardin, Rebecca. “Concessionary Politics in the Western Congo Basin: History and Culture in Forest Use.”
drawn at least as early as Congo’s independence, though it is possible that they were determined by French colonial officials, who established forest concessions in order to organization timber exploitation operations to supply markets in Europe throughout the duration of their rule. Finally, Forest Management Units (UFA’s) were designated in Congo’s 1974 Forestry Law in an effort to ensure each territory allocated as a concession for commercial exploitation had a plan for management of the forest resources available within its boundaries. The presence of multiple layers of territorial boundaries often confounds local administrative domains, but for the purpose of this paper the UFA’s owned by each foreign timber company are most important, as these are territorial units over which private foreign firms have bargained with the center and which I argue resemble states in a sort of quasi-federation.

Geographic Distribution of Rates of Exploitation and Shirking of Goods Provision

The foreign timber companies bargain the terms of their concession contract, which includes a document (cahier des charges) enumerating the social goods and services the company is required to provide throughout their tenure which generally lasts for 30 years, with the potential for renewal, depending on the type of the contract. Additionally, each company must obtain a yearly permit from the government, stating the maximum volume that can be cut, and the resulting taxes owed to the central government. Given the weak bureaucratic capacity of the Congolese government, enforcement of these permits is minimal and independent monitoring groups in the region suggest significant levels of corruption.

During the 1980’s forest inventories conducted by the FAO suggested that a sustainable rate of timber extraction for Congo, given selective logging, was 2 million m$^3$ of the five principle species per year. However, the northern forests could sustain 1.5 million m$^3$ per year while the southern forests could only sustain 500,000 m$^3$ per year (if diversified to 10 principle species). A 2007 World Bank report on
Congo’s forestry sector suggests that the North can sustain 2 million m$^3$ while the estimates of sustainable extraction in the south were somewhat less certain (placing 500,000 m$^3$ beyond the upper bound of long term viability). While these rates have not been updated to reflect the current state of forests, given the overall increase in extraction of the country’s timber, it is reasonable to believe that estimates of the total volume of extraction that the country’s forests can sustain has not increased and we may take this to be a conservative estimate of a sustainable rate of extraction.

Reports compiled by monitoring NGOs and intergovernmental bodies$^5$ indicate that violations of logging contracts are equally frequent in the North and the South, but that fines received for infractions of overexploitation are more commonly collected in the North. However, regional independent monitoring groups$^6$ suggest that the bulk of the infractions with respect to overexploitation occur in the south of the country, where forests are overall less profitable. Additionally, conversations with local inspectors in the region suggest that while rates of the recovery of fines for violations do not necessarily correspond to more or less profitably forested regions, the actual rate of infraction is much higher in the south. Specifically, in 2002 between 100,000 and 130,000 cubic meters of timber were exploited in one southern concession, despite the rate set by the forest management plan of 40,000 cubic meters per year.$^7$ As a result, a local Divisional Council stated that “logging companies…freely exploit timber in our division without taking into consideration the contract specifications…after a few years the forest zone of Niari region will become a desert.” However, no sanctions or punishment was issued to the southern logging companies in question, in spite of the fact that “the authorized allowable annual cut [was] being greatly and systematically exceeded”.$^8$

$^5$ Resource Extraction Monitoring, Forest Watch, FAO
$^6$ Resource Extraction Monitoring
$^7$ FLEG-T Report 2003
$^8$ AFLEG Report pg 49
The World Bank Report\(^9\) concluded that while extraction in the North totaled only 977,017 m\(^3\) of the five principle species in 2004 (this number only increases to 996,056 if the top 15 species are included), extraction in the south was estimated at 470,340 m\(^3\), and at 503,125 m\(^3\) if the top 25 species are included. While extraction in the south does not appear to be significantly above the estimated rate of long term viability, it is the variation between the north and the south and the degree to which they meet or surpass this estimated rate that is of interest.

Table 1 demonstrates the amount of timber extracted from each region between 2000 and 2004. While somewhat outdated, it suggests that while rates of extraction increase in both regions, in the five years listed, timber exploitation grows by 79% in the north, and by 376% in the south, with the rate of extraction exceeding projections for long term viability in 2004.

<table>
<thead>
<tr>
<th></th>
<th>Volume Extracted by region 2000-2004, m(^3)</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
<td>2001</td>
</tr>
<tr>
<td>North</td>
<td>523299</td>
<td>622504</td>
</tr>
<tr>
<td>South</td>
<td>107599</td>
<td>272612</td>
</tr>
</tbody>
</table>


**Concessions as states and Congo as a quasi-federation**

The territorial boundaries defining UFAs create a basic geographic domain of operation for foreign enclaves, perhaps the most apparent feature shared with states in a federal system, and one of the central features of federal institutional designs. However, there are two more substantive dimensions along which these foreign investment enclaves resemble states in a way that is relevant to the aforementioned theory: their relationship to the central government and

---

their provision of goods and services. In order for these territorially bound foreign enclaves to resemble states, these entities must at least resemble a government and as well as resemble a state government in relation to a federal government. Most importantly, the aspect of fragmentation created by federalism, particularly the lack of institutional guarantee of transfers or a significant degree of redistribution between concessions in general, is the key mechanism which ties the resemblance between foreign investment enclaves and states to the incentives to overexploit natural resources.

All UFA’s are required by Congolese law to have a forest management plan which includes a cahier des charges which enumerates required public and social goods provisions. Consider the cahier des charges to be a major component in the budgetary restraint B from the model. In Congo, timber companies provide a variety of public goods in exchange for the extraction of resources in the region (from which local populations might otherwise derive some socioeconomic benefit). Each foreign investment enclave in Congo may retain a different degree of authority over their geographically defined territory or provide differing levels of goods and services to the local populations. However, all firms controlling UFA’s in Congo negotiate a contract with the center to extract resources in exchange for providing goods and services in the region, much like a state government.

In order to illustrate the degree to which firms provide goods and services similar to those provided by state governments in federations, it is helpful to consider the case of the French firm CIB, who operates several UFA’s in the north of Congo. In one of its concessions CIB provides schools, hospitals, housing, clean water, electricity, communications networks, and aid for small business development for the 26,000 inhabitants. It also employs “eco-guards”, a group of armed security guards hired from the local population who patrol the concession. As mentioned,
not all concessionaires provide the same level of services and there are several different models of the degree to which concessionaires provide for those within their concessions\textsuperscript{10}. In the south of the country the UFA’s are much smaller, though as in the north, several are often leased by the same foreign timber company. The public goods and services are not provided at the same level, despite that companies are still required to negotiate contracts including the \textit{cahier des charges} with the central government.

In addition to the ways in which these concessions resemble states in their provision (if uneven) of goods and services, these concessionary-states constitute a \textit{quasi-federation}. First and perhaps most apparent, there are certain goods and services that are in the purview of the concessionaire, not the central government. Specifically, the provision of goods and services listed in the \textit{cahier des charges} are explicit declarations of such a division, even if such provisional requirements are not adequately enforces. Policy domains are relegated to foreign firms by a codified and agreed upon contract, just as policy domains such as education and development projects are often stipulated as domains within state authority.

Second, the “concessionary-states” are legally bound to the central government and required to provide it with resources. Concessionaires have bargained for the rights to extract resources, (constitutionally the property of the state) from a territorially bounded region in exchange for the provision of goods and service the population within their concessions. The central government of the Congo continues to collect taxes from timber companies throughout the tenure of their timber operation. Similarly, the central government in federations extracts some set of resources from the states that constitute it (i.e. contributions to the national military force etc). Thus rights for extraction of resources are bargained for over a territorially defined space, in which the proprietor is expected to provide a set of public goods within the boundaries

\textsuperscript{10} Ben Singer CIRAD
of a legally defined territory. While *cahier des charges* are not identical across concessions, they are a pre-determined set of public goods that concessionaire’s are expected (in fact legally bound) to provide in exchange for the extraction of resources which continue to be defined as the property of the government of Congo.

Finally and perhaps most importantly, I address the question of interstate transfers and redistribution. Treisman notes that is politically economically risky for federal governments to enforce targeted transfers and redistribution of revenues between regions. Furthermore, federal constitutions do not, necessarily guarantee the redistribution of revenues between states. Specifically, the presence of hard budget constraints, or the potential for instability resulting from exacerbation of asymmetries within the federation make it difficult for federal governments to be able to commit, in the long term, to interregional transfers than unitary states. The allocation of revenues extracted from within a state, other than a portion which is provided to the central government, is the prerogative of the state authority. Similarly, firms operating in the Congo are part of the international market, and consequently, compete to maximize profits and market penetration. Because concessionaires are international market actors engaged in competition, incentives or institutional bodies to enforce “inter-firm” transfers are (quite apparently) antithetical to the tenants of market competition. These companies are, *de facto*, responsible for providing services for those within the boundaries of their concession, independent of their revenue from that year. Consequently if the revenues derived from sustainable rate of extraction ($r^*$) is not sufficient to cover the goods and services listed in the *cahier des charges* for a region like the southern Congo and there is minimal enforcement of extraction rates, firms are likely to highly discount the future in order to cover present expenses.
As a result, the actual rate of extraction $r$ will exceed $r^*$, as we in fact observe with greater frequency in the south of the country where resource extraction at the same rate is less profitable.

**Conclusion**

If federations exacerbate tendencies to overexploit, than it is not surprising that unitary states in which regions act like states in a *quasi-federation*, are more likely to exploit at an unsustainable rate than those that manage their resources in a less fragmented manner. This paper is a humble and somewhat non-traditional approach to understanding the implications of federalism for the sustainable management of natural resources. To derive strong conclusions and generate more robust, nuanced and generalizable theories, additional case study analysis is required. Furthermore, a large-n study of federations and natural resource depletion to provide support or refutation to the theory and case I have proposed would help evaluate the utility of further engagement with the incentive structure outlined here. In any case, in light of recent recognition of the importance of local institutional design for the sustainable management of natural resources, questions of the federalist persuasion are becoming unavoidable.
Works Cited


Resource Extraction Monitoring. *Missions and Reports Completed since 2002, and informal interviews conducted over the past year.*


Singer, Benjamin. *CIRAD,* Paris. *Casual interviews over the last year.*
