Criteria and indicators for sustainable forest management in the face of decentralization: are they still relevant in their current form

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The United Nations Conference on Environment and Development’s (UNCED) Rio Declaration and Statement of principles for the sustainable management of forests were adopted in 1992, with the objective of initiating sustainable forest management (SFM) to ensure conservation and maintenance of ecosystem services while still allowing for continual use of forests for economic, social and cultural purposes. Since then many other Criteria and Indicator (C&I) frameworks have been developed, reflecting the growing worldwide demand for socially and environmentally responsible forestry. Much research has been devoted to designing and refining appropriate C&Is to reflect the particular ecological, socio-cultural, economic and political characteristics of distinct forests. This work has expanded the definition of SFM and facilitated monitoring of local management actions. However, increased decentralization of forestry governance and the rise of community forestry worldwide in the past decade are rapidly transforming the face of forestry and forest services across local and international scales. In light of this trend, we revisit current C&I frameworks – which have been based on fixed expectations and measurements of stable processes against past conditions – to ask: are they still relevant? In this paper we present an analysis of case studies where this change is occurring. Within each case study, we seek to identify the limits of current C&I frameworks for addressing the shifting trends and dynamic processes that affect forest management outcomes. Recommendations for adapting current C&I frameworks are discussed.

Keywords: Sustainable forest management, criteria and indicators, decentralization, case studies

Introduction

Following the UN Conference on Environment and Development and the emergence of The Forest Principles and Chapter 11 of Agenda 21 in 1992, a number of international, regional and national initiatives were created to identify criteria and indicators (C&I) to provide a common framework for describing, assessing and evaluating progress in countries’ efforts to practice sustainable forest management (SFM) (Grayson and Maynard 1997). International and regional C&I were created to be applied broadly for different forest types, and were intended to provide a common understanding of what is meant by SFM within these forest types. At the national level, most forest nations have produced and are still producing C&I adapted to national circumstances and values.

Many C&I schemes share similar principles, but there are differences in thematic emphasis (social, cultural, economic or ecological emphases), in diversity of content and structure (Pokomy and Adams 2003), in their monitoring and reporting requirements (Hickey and Innes 2006), and, at the national and sub-national level, in their development and implementation (Mrosek, Balsillie et al. 2006). Formulating indicators has improved the assessment and communication of successes and failures in management.

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(Prabhu, Ruitenbeck et al. 2001), helping to reshape the concept of forest management. The ultimate effort is to apply these indicators, developed on national and regional scales, to the smaller scale of the forest management unit (FMU) (Prabhu, Colfer et al. 1999), which exposes new issues.

One concern is that of the ready adaptability of indicators to various contexts. The current process of developing C&I sets has been to select indicators based on political expediency, data availability and ease of measurement rather than informational content (Brang, Courbaud et al. 2002) or need. This is, in part, due to the complexities that confront our efforts to define what exactly we mean to sustain when we create an SFM system (Gough et al. 2008). Even as policy makers call for indicators that are easy to understand, inexpensive to measure and supported by political consensus, the tendency is for C&I to become mired down in the production of enormous “laundry lists” of conceivable indicators within the broad spectrum of social values (Gustavson et al. 1999).

Furthermore, the use of static C&I sets is put in question in the face of swift and profound changes occurring to forest ecosystems and societies. Changes in climate have had and will continue to have considerable implications for forests and forest management, and the adaptability of fixed indicators to accommodate the evolution of desirable ecological and social values in the face of climate change is open to discussion. However, this paper focuses on the ability of current C&I to accommodate another type of change occurring globally: decentralization of forest governance.

In the last two decades, many governments have begun to shift toward community and local management and ownership of forests (Agrawal, Chhatre et al. 2008). This change is partly in recognition of legitimate claims of indigenous and local communities and the limits of public forest governance (White and Martin 2002). Researchers concerned with SFM of tropical forests argue that transferring a varying degree of responsibility to the local communities who get their livelihood from them can lead to better forest management outcomes (Bray, Merino-Pérez et al. 2003; Contreras-Hemosilla, Gregerson et al. 2006). In addition, such decentralization of decision-making has the potential to increase local-level capacities to deal with climate change and related threats (Agrawal and Ribot 1999; Osman-Elasha and Parrotta 2009; Ribot et al. 2006). However, the individual and organizational experiences with decentralization vary widely and significant barriers may exist that hinder the potential positive effects of decentralization on both forest management and adaptation to climate change. Nevertheless, the trend is towards increasing decentralization: approximately one quarter of forests in the developing world are community-owned or managed, and more than three quarters of developing countries and countries in transition are in the midst of experimenting with decentralization (Contreras-Hemosilla, Gregerson et al. 2006). Furthermore, small and medium-sized enterprises, including those owned by communities, are widely known to comprise the bulk of forest industry globally (Miyasaka Porro and Stone 2005; Molnar, Liddle et al. 2007), when most C&I schemes have been created with a large-scale forestry industry in mind.

Considering these changing trends in forest governance, highly pertinent questions arise when merging a global dialogue on principles of SFM with a local-scale issue: Are current C&I sets adequate for taking into account this decentralization trend? Are the original function and composition of national and regional C&I sufficient to address appropriate responses and management actions at the local level? In the face of devolving more power to communities to manage their forests, it is vital to question whether our definitions of SFM, as described by national, sub-national, or regional C&I sets, take into account the needs and perceptions of these local communities, and their ability to adapt to further environmental and social changes. Here we present case studies from community forest management in tropical, temperate and boreal forests, which critically question the continued relevancy, appropriateness and limits of current C&I for addressing decentralized forest management.

**Methods**

A case study approach was used to examine the relevancy of applicable C&I sets for three case studies – community forest management in tropical, temperate and boreal forests. For each case study, a desktop study was conducted to explore the relevancy of the applicable C&I sets to community forest management in each situation. In addition, interviews with local communities in each study allowed for further assessment regarding the degree to which these ecological and socio-economic indicators are locally meaningful and functional in a decentralized forest management setting, and to ask to what extent they take into account and reflect socio-cultural, economic and ecological management goals of local communities managing their forests. Indicators that conformed to these requirements were deemed “applicable.”
The approaches used by each case study vary: the first assesses the appropriateness of six C&I sets that have been created to be applied within the Brazilian Amazon, by assessing their applicability to examples of community and family forestry practices in the eastern Amazon; the second compares the management objectives of the Tsleil-Waututh First Nation in temperate forests of southwestern Canada with the national set of C&I; and the third assesses the appropriateness of C&I created through a participatory, bottom-up approach in addressing community needs, in the face of decentralized management of climate change-affected forest ecosystems in the boreal forest of the Champagne and Aishihik Traditional Territory in the Yukon, northern Canada.

Results and discussion

Case study #1: Community and family forestry in Amapá and Pará, Brazil

Since 1993, community-based timber management projects in Brazil have been initiated in national forests, extractive reserves, and agricultural colonization areas, after community forestry was identified as one of the principal means to reduce deforestation (Miyasaka Porro and Stone 2005). In addition to the external push for devolution of forest management to communities in a formalized manner, smallholders throughout the Amazon have traditionally managed their forests for timber production as an integrated part of their complex and dynamic resource management practices, using the sale of timber as part of an economic safety net in times of hardship (Pinedo-Vásquez, Zarin et al. 2001; Scherr, White et al. 2003).

Six C&I sets relevant to the Brazilian Amazon were analyzed in this study for their applicability to communities practicing family forestry (Mazagão, Amapá) and to collectively-managed forests (Nova Vista and Nuquini, Pará); the revised C&I for the management of natural tropical forests (ITTO 2005); CIFOR’s Generic Template (CIFOR 1999); CIFOR C&I for sustainability in community-managed forests – the Brazilian Amazon C&I (Ritchie 2000); C&I of sustainability of forests in the Amazon (Tarapoto 2001); the Brazilian Standard for Forest Management – Principles, Criteria and Indicators for native forests (ABNT 2004); and the standards of the Forest Stewardship Council (FSC) terra firme for the Brazilian Amazon (FSC 2004).

Looking at the six C&I sets in aggregate, almost a quarter of all the indicators are either not applicable at the community level, such as indicators on investment in technology transfer and extension created specifically for measurement at the national level, or the indicators address impacts of large, industrial-scale forestry activities on communities, such as ensuring that local populations are compensated for any loss of land or resource, or are not adversely affected by nearby large-scale forestry practices. These indicators do not reflect the perspective of a community managing its own forest. The remaining three quarters of the indicators can be interpreted to be applicable to communities, of which less than a quarter were created specifically for community forests: 85 indicators are from CIFOR’s C&I created for communities in the Brazilian Amazon, and 5 from FSC’s terra firme standards. Interestingly, socio-economic and policy and legal framework indicators of the C&I sets are less applicable to community forests (respectively, 55% and 66% of indicators are applicable) than are indicators on conservation of forest cover and biological resources and on sustainable forest production (94% of indicators in each category are applicable). However, the lack of capacity to monitor some of the more technical indicators of the latter categories puts in question their utility in a community forestry setting.

Additionally, certain indicators that could be applied at a community scale contradict local management practices. For example, FSC’s indicator on reducing job rotation and the number of temporary jobs contradicts the practice in some communities to rotate forest-related employment opportunities, to ensure that many community members benefit to some degree from the added source of employment and income. Another example is CIFOR’s indicator on zoning for multiple objectives within the FMU; in many community and family managed forests, multiple forest use objectives are often integrated spatially, with extraction of timber, palms, latex and bushmeat occurring in the same area.

Overall, the C&I need to be revised to include additional factors of importance to communities, and to determine which existing indicators are not applicable to communities. Additionally, it is necessary to adjust the C&I framework to accommodate the unique integration of management of resources in traditional practices.

Case study #2: The Tsleil-Waututh Nation, British Columbia, Canada

The Tsleil-Waututh Nation (TWN) are a Coast Salish People in southwestern British Columbia (BC), Canada, and has approximately 400 members. Their traditional territory includes both heavily urbanized
areas, and rural areas that are considered among some of the most intensively exploited lands in BC. The Nation has been incrementally securing and purchasing forest lands and tenures in the Indian River watershed in order to restore an area important to their history, culture and economy. This process has transformed the local tenure composition and forest management regime by effectively transferring management authority from industrial forest companies to the Nation. The Inlailawatash Forestry Limited Partnership (IFLP) was created to manage these forest holdings.

Having increased management authority over the area allows the TWN to create ‘beyond compliance’ standards for themselves that testify to the high level of stewardship that is inherent in their relationship with the land and with each other. The long-term goals of the TWN in terms of its forest stewardship approach are articulated through the IFLP, and include, _inter alia_, to: provide a positive example of sustainable forest resources stewardship and practise a high level of forest conservation; maintain and restore resources for the Nation’s cultural activities and sustenance uses; create economic opportunities; strengthen the Nation’s skills and knowledge base in forest management; and practice an adaptive management approach. Based on these, they have articulated a set of objectives, strategies to achieve each objective, and indicators that can be used as tools to measure progress.

In common with many aboriginal groups in Canada, the TWN did not find the Canadian Council of Forest Ministers (CCFM) C&I, which guides the definition of SFM in Canada, suitable to their situation. In comparison to the Tsleil-Waututh forest stewardship vision, the discourse and frame of reference of the CCFM, where indicators predominantly address proof of compliance with SFM for major forest companies, cannot adequately address the TWN’s unique worldview and small-scale, decentralized forest operations, where local knowledge and relationships are held in high regard.

The CCFM incorrectly makes the assumption that First Nation values can be ‘siliced’ into categories. This contrasts with the Tsleil-Waututh’s worldview and stewardship style that integrates land, water, and marine elements in their management plans. In addition, the CCFM is designed by a third party that is seeking certain pieces of information and not designed to meet the information and knowledge needs of the TWN. In the Tsleil-Waututh land-use vision, local knowledge is considered to be of equal or greater value than scientific knowledge and the two are used together (e.g., in measuring the historic range of variation to assess advancement in restoration efforts, and for soil and water monitoring). The Tsleil-Waututh have the benefit of being on the ground and being able to observe and monitor forest indicators in more qualitative ways, on a more consistent basis (i.e. through monitoring of salmon health, elk, invasive species, landslides and other erosion issues, etc.), and over a very long time horizon. Measuring progress of restoration efforts, which are prioritized over forest harvesting, involves establishing a picture of the historic range of variation of an area through Tsleil-Waututh peoples’ long history and intimate relationship with the landscape. Their local knowledge forms the basis of restoration goals, plans, and vision. As well, unlike the CCFM, the Tsleil-Waututh stewardship includes the informal and continual assessment of relationships, not just components, of the human-ecological landscape. These relationships exist both between the land and the people and between people inside and outside the community. The values upheld in these relationships are mutual respect, inclusivity, loyalty, knowledge sharing, equity, collectivity, transparency and trust.

Overall, the Tsleil-Waututh vision of forest stewardship goes beyond compliance with government regulation and even the FSC forest certification standards that they adhere to, in order to satisfy the expectations and needs of the community. This includes restoring ecosystems, initiating carbon management practices that will conserve forest resources and reduce dependency on annual timber harvests, pursuing forest management practices that are in line with community values, and overcoming capacity constraints to pursue these goals. The FSC standard, which is crafted for small operations, and is more appropriate to their situation than a national suite of indicators such as the CCFM is still lacking in capturing the Nation’s unique worldview and forest management objectives.

**Case Study #3: Champagne and Aishihik Traditional Territory (CATT), Yukon, Canada**

The Yukon Territorial Government and Champagne and Aishihik First Nation Government, together with the Alsek Renewable Resource Council, engaged in a collaborative process to develop the Strategic Forest Management Plan (SFMP) (SFMP 2004) and Integrated Landscape Plan (ILP 2006). The development of the SFMP marks an initial step towards decentralized forest management that is the first of its kind in the Yukon. The management priorities of the SFMP are to reduce fire hazard, enhance forest renewal, increase or maintain economic benefits, and preserve wildlife habitat. The SFMP builds upon a hierarchy of goals, objectives and indicators combined with an adaptive management framework, including monitoring the
effects of forest management activities and modifying practices to ensure that the goals and objectives are being met.

The forest ecosystems of the region have the potential to be strongly affected by changes in natural disturbance regimes associated with the effects of climate change. Climate change impacts are already occurring in the CATT: a spruce bark beetle (Dendroctonus rufipennis) epidemic has affected nearly 380,000 ha (of an estimated 600,000 ha) of forest in the CATT (ACIA 2004; Berg, Henry et al. 2006). The SFMP was created in response to the bark beetle epidemic, to provide a management framework to develop a local forest industry within the CATT, focused on salvage harvesting of beetle killed stands.

This case study seeks to evaluate to what extent the C&I framework developed within the Champagne and Aishihik Traditional Territory (CATT) is addressing the goals and objectives outlined for achieving sustainable management, given the decentralization of forest management in the region. Included in this is an assessment of the C&I set’s ability to contribute to adaptive management, it reviews whether indicators are proactive (adaptive) or reactive (mitigative) in addressing drivers of change.

An evaluation of the C&I framework revealed that the goals of encouraging and enhancing decentralized forest management with the SFMP are effectively addressed within the current management goals of the framework: three out of four goals are geared towards generating and maintaining community benefits, developing local economic capacity and undertaking cooperative forest management. 54% of the CATT indicators are related to decentralization, or every second indicator in the suite. The fourth goal, on functioning forest ecosystems, mainly addresses climate change. The measures related to climate change are predominantly ecological and reactive: 55% of the objectives related to this goal are reactive, while only 8% of objectives for the goal related to decentralization are reactive. The development of C&I framework was due, in part, to a reaction to recent catastrophic events and this has resulted in divergent approaches among the four goals of the CATT C&I framework: the objectives regarding decentralization are more proactive while those pertaining to climate change are more reactive. This is important when assessing how well the decentralized governance system can increase the region’s adaptive capacity regarding climate change. A reactive approach to climate change suggests mitigative, rather than adaptive, actions. Furthermore, the framework addresses adaptive management but the 7 objectives for this topic have yet to be developed. This may imply that while decentralized forest management planning in the CATT has the potential to reduce vulnerabilities to climate change, the indicators selected in the SFMP and the progress of the development of the SFMP suggest that significant barriers exist to realizing this potential.

Emerging themes

The Brazilian and Tsleil-Waututh case studies point to a central problem that occurs when trying to fit the same C&I sets to forest operations at different scales, tenure systems and management intensities: C&I sets created through a top-down approach favor industrial forestry and seem to be more concerned with impacts of forest operations on nearby local communities, instead of reflecting management from the perspective of a community that is managing its own forest. In contrast, the CATT case study shows that the suite of indicators crafted locally through a participatory approach is more suited to the needs of communities involved in decentralized forest management. Internationally, some consideration is being given to small and low intensity managed forests (SLIMFs) through the Forest Stewardship Council, but this mostly calls for reduced monitoring to reduce costs of certification, and to a limited extent for national standards to be adapted to low management intensity situations. The unique characteristics of community-managed forest operations, and of traditional and indigenous management practices, are often not sufficiently reflected in national and regional C&I sets. Generic templates such as these have also been criticized elsewhere for having been developed using a “top-down” approach that does not generate information that is specific enough to address local forest management issues (Karjala and Dewhurst 2003). Given this emerging theme from these case studies, it is pertinent to continue to question whether C&I meant to monitor and assess industrial forestry can be useful to communities. Should we be trying to make approaches that focus on large-scale forestry fit the priorities of communities managing their forests, or would we benefit from creating separate C&I for communities through a more bottom-up approach?

The Brazilian and Tsleil-Waututh case studies show that, with this top-down approach, an important aspect of traditional forest management of local communities is not considered in the formulation of C&I sets: in such communities, it is difficult to silo values and practices into categories. Traditional forest management often involves the spatial integration of land and forest uses, thus it is impractical to consider timber harvesting as a unique activity among other livelihood practices. In the CATT case study, a timber harvesting industry is being initiated under the constraints of maintaining community well-being and
ensuring traditional forest resource use is maintained or enhanced. This highlights the participatory bottom-up approach that was used to develop C&I and is in contradiction to the classic timber-centric management paradigm that is embedded in an industrial forestry perspective. C&I sets that take an industrial forestry perspective on measurement and assessment are less able to assess multiple land and forest uses. Nijnik, Mater et al. (2008) argue that sustainable forest management represents a post-productivist approach to forestry, where multiple values are represented adequately and timber production is no longer the first and dominant priority in management; this seems to better suit the community forestry needs brought up in the case studies. If there is a link between decentralization and the rise of multiple-value forestry, it is reasonable to consider uncoupling national-level C&I from a timber-dominated discourse, so as to become more relevant at the local-level.

CIFOR has recognized the limitations in applying regional and national C&I sets to a community forestry setting, and has produced and tested C&I sets specific to community management in three pilot countries - Brazil, Cameroon and Indonesia (Ritchie 2000). These C&I include several important factors for communities, including: collective agreement to management plans; internal regulations, for example, to limit forest fire spread when clearing land for agriculture; and that the intensity and frequency of extraction can be based on the scientific literature, proven field experience and local knowledge, without the necessity of continuous data from the management unit. The set also includes an indicator on cultural agricultural practices minimizing impacts on forests. This is a first step to understanding that multiple land use practices are integral to livelihood strategies in many communities, resulting in a landscape mosaic of agriculture, agroforestry, and timber and non-timber uses of forests; a further step would be to produce indicators that look at the interactions between these land uses, rather than just at the impacts of one land use on the other. This exercise would produce more meaningful indicators of resource management, as it is often difficult to spatially compartmentalize smallholder land and resource management.

National and regional C&I sets examined here appear to be less relevant to communities especially when considering socio-economic indicators, highlighting the importance of contextualizing such indicators at the local level. The Tsleil-Waututh case study suggests that socio-economic indicators in the CCFM and in the FSC standards are framed from a non-Aboriginal perspective and are not very relevant to the TWN unique worldview. The Tsleil-Waututh have expressed difficulty in accepting FSC Aboriginal indicators because these indicators are written from the perspective of a non-Aboriginal forest operator consulting with Aboriginal people and is not inclusive of a scenario where an Aboriginal group is seeking certification. Similarly in the Brazilian case study, current socio-economic aspects in C&I suites have lower applicability to community and family forestry than do ecological and production indicators, and are missing indicators on communities’ social and economic values and goals. The CATT case study shows that C&I developed through a local participatory approach are highly responsive to local priorities; the C&I framework developed in the Yukon deals predominantly with decentralization and climate change, which are not topics that currently dominate most SFM monitoring frameworks. Socio-economic indicators are more meaningful when created in the specific context where they will be employed, but this often means that the information to monitor these indicators has not been previously collected by the government. Under increasing decentralization, is it more pertinent for governments to build capacity for local-level socio-economic monitoring instead of creating concomitant, but less meaningful, sub-national and national monitoring schemes?

The prioritization of adaptive management and long-term planning are also emerging themes in community monitoring schemes. Currently, criteria and indicators are consistent with a reactive approach to sustainable forest management. They typically measure proof of compliance with SFM for large, industrial forest companies. Information garnered through the C&I process is used to calculate mitigative actions in response to unsustainable practices but do not address the impacts until they have already been felt in community. Thus, at the local level, proactive approaches may be considered more valuable. In the CATT case study, a key objective regarding the goal of community sustainability and benefits is to “manage forest uses and developments consistent with ecosystem capacity and long-term sustainability.” This objective is linked to the establishment of an adaptive management strategy that has a clear methodology, consistent procedures and that can be replicated over time to provide comparison of results and changes. The Tsleil-Waututh also reflect the need for adaptive management in their traditional territory. They want the flexibility to maintain their forests according to their vision of good land management and this includes long-term planning for restoration and conservation of important species. In the Brazilian family forestry case study, the emphasis is also on dynamic practices, such as safety net harvesting where timber is sold only occasionally when a household is in need of additional income. The communities in these case studies...
recognize that they have to be able to make decisions locally to adapt to changes, especially when the 
stability of their community and environment is at stake.

However, while one may hold up the CATI case study as a good example of how C&I can be made 
relevant through a participatory, decentralized planning process for forestry, the new issues that arise in this 
process cannot be overlooked. The reactive nature of the C&I suite resulting from this decentralized 
planning process may point to a lack of capacity and organizational structure needed to properly realize the 
potential for local adaptation under decentralized management. This may be due to an incomplete transfer of 
authority over resources, especially the flow of benefits from utilizing forest resources, or may stem from 
the lack of experience with new roles and responsibilities in a changing institutional environment. A 
concomitant state or national process for supporting and training local-level actors in implementing and 
managing C&I at the local-level would be vital to reaping the full potential of the benefits from 
decentralized sustainable forest management.

Conclusion

Given increasing decentralization of forest management worldwide, the three case studies presented here put 
in question the continued relevancy of current C&I to communities managing their forests. They indicate 
that C&I created through a collaborative process at the local level can be more reflective of community 
needs and perspectives, as well as traditional management practices, than those created through a top-down 
approach. However, it is also imperative that such locally-created C&I be proactive rather than mitigative, in 
order to anticipate and adapt to future changes and challenges. While C&I can still be considered a useful 
tool for monitoring forest management and defining sustainable management practices, in order to remain 
relevant to forest managers it is essential to update current C&I sets to reflect the changing global context in 
which they function.

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