

## Mediating Forest Transitions: 'Grand Design' or 'Muddling Through'

Jeffrey Sayer<sup>a,#</sup>, Gary Bull<sup>b</sup> and Chris Elliott<sup>c</sup>

<sup>a</sup>International Union for Conservation of Nature,  
Rue de Mauverney 28, 1196 Gland, Switzerland

<sup>b</sup>Forest Sciences Center, 2022-2424 Main Mall, University of British Columbia,  
Vancouver, BC, V6T1Z4, British Columbia, Canada

<sup>c</sup>Worldwide Fund for Nature-Canada, 1588-409 Granville St., Vancouver,  
V6C1TZ, British Columbia, Canada

<sup>#</sup>Corresponding author. E-mail: jeff.sayer@iucn.org

---

### Abstract

Present biodiversity conservation programmes in the remaining extensive forest blocks of the humid tropics are failing to achieve outcomes that will be viable in the medium to long term. Too much emphasis is given to what we term 'grand design'—ambitious and idealistic plans for conservation. Such plans implicitly oppose or restrict development and often attempt to block it by speculatively establishing paper parks. Insufficient recognition is given to the inevitable long term pressures for conversion to other land uses and to the weakness of local constituencies for conservation. Conservation institutions must build their capacity to engage with the process of change. They must constantly adapt to deal with a continuously unfolding set of challenges, opportunities and changing societal needs. This can be achieved by long term on-the-ground engagement and 'muddling through'. The range of conservation options must be enlarged to give more attention to biodiversity in managed landscapes and to mosaics composed of areas with differing intensities of use. The challenge is to build the human capacity and institutions to achieve this.

**Keywords:** forest transition, deforestation, landscape approaches, scenarios, forest conservation strategies, conservation institutions

---

### INTRODUCTION

MANY OF THE REMAINING AREAS of extensive natural forests in the tropics are under increasing and competing pressures. Conservationists want to preserve the environmental values of forests, while the agricultural, energy and forest industries are hungry for raw materials and land (Nilsson 2007). Meanwhile local communities and indigenous people are asserting their rights to the forests that they have traditionally used (White & Martin 2003). Present trends suggest extensive infrastructure development and clearance in coming decades. This process has been described as the 'forest transition' (Chomitz 2006). The threats posed by the forest transition in the Amazon and Congo Basins, New Guinea and Borneo are central concerns of the conservation community (Sayer *et al.* 2000; MEA 2005).

At present there appears to be a heavy investment in what we term the 'grand design' of ideal conservation

plans. International conservation organisations and governments are engaged in multiple and sometimes duplicative initiatives in Borneo, the Congo Basin, and the Amazon, and there are ambitious plans for mega-corridors for meso-American and the Mekong countries. Some of the early efforts of these initiatives are not promising. For example, a recent European Commission study concluded that the USD 1.2 billion spent on forest conservation in Indonesia over the past two decades had failed to stem the flow of forest destruction and degradation (EC&MF 2006).

We will argue that 'grand design' conservation plans are often not sensitive to the development aspirations of tropical developing countries or to the power of market and other extra-sectoral forces. The alternative has been described by Sayer and Campbell (2004) who suggest that more investment is needed in engaging with the process of change and working 'within the system' (Sayer & Campbell 2004) to seek outcomes that reconcile so-

cities changing needs for development with changing opportunities for biodiversity. This approach has been defined by Lindblom (1959) as 'muddling through', i.e., the long term engagement in the messy processes of influencing decisions and activities on the ground.

### BRIEF HISTORY

There have been many earlier global initiatives to conserve or sustainably manage tropical forests. These included the Tropical Forest Action Programme, pilot payments for environmental services schemes, the Global Environment Facility, debt for nature swaps and 'conservation concessions'. All were hailed as major advances, but far too much emphasis was placed on the biophysical world and none have stemmed the tide of forest destruction (UNEP 2002; Sengupta & Maginnis 2005)

The criticisms of conservation initiatives contained in the European Commission and the Ministry of Forestry (2006) study of Indonesia are reflected in more wide ranging studies such as McShane and Wells (2004), Sayer and Campbell (2004) and Brown (2002). The general conclusions are that the initiatives have been:

- highly sectoral in nature
- dealing with symptoms not underlying causes
- taking short term perspectives
- rooted in incorrect assumptions drawn from the agendas of donors and conservation organisations
- ignoring the priorities of the local people who they were supposed to benefit
- ignoring longer term development trends and trajectories

We conclude that, with some notable exceptions, conservation efforts in the developing tropics are not working. We are also concerned that conservationists are adopting new policy frameworks, such as the Millennium Ecosystem Assessment (MEA), or new 'grand design' programmes, such as the Reduced Emissions, Degradation and Deforestation (REDD), without sufficient critical analysis of the reasons for failures or limited successes of past efforts (Redford & Taber 2000).

### MILLENNIUM ECOSYSTEM ASSESSMENT

The exploration of scenarios by the MEA (2005) is particularly useful in providing a conceptual framework for future large scale conservation initiatives. The MEA postulated four global scenarios whereby the relation between development and environment might unfold. The 'global orchestration' scenario depicts a worldwide connected society in which markets are globally integrated and international institutions are able to deal with environmental problems. However, these problems would be addressed reactively. The scenario is vulnerable to surprises arising from delayed effects or unexpected occurrences

and one could argue that the global policies initiatives described earlier are closely aligned to this scenario.

The 'order from strength' scenario represents a regionalised and fragmented world concerned with security and protection. It emphasises regional markets and pays little attention to environmental public goods. Environmental problems would be addressed locally if at all.

The 'technogarden' scenario portrays a globally connected world relying on advanced technology and intensively managed engineered ecosystems to deliver needed goods and services. Overall ecological efficiency improves but the scenario is reliant on the inherent risks of human-engineered solutions.

Finally, the 'adapting mosaic' scenario depicts a world with a high degree of local autonomy that is less dependent on discredited global institutions. Local ecosystem-based management strategies would emerge and local institutions would gain influence. Investments in human and social capital would be geared towards improving knowledge about ecosystem functioning and management (MEA 2005).

Conservation organisations are implicitly aligning themselves with these different scenarios. For the sake of our argument we closely align the 'grand design' with the hard core, 'barriers and fences' movement or 'global orchestration' scenario. For the sake of brevity we will not discuss the shortcomings of the 'order from strength' or the 'technogarden' scenarios. The final, 'adaptive mosaic' scenario, is closely aligned with the idea of 'muddling through'. In our view, explicit pursuit of the 'adapting mosaic' scenario of the MEA provides a good conceptual framework for addressing the problems of major forest transitions. This is also consistent with a consensus emerging amongst the more mainstream conservation organisations that flexible, adaptive and integrative approaches have a higher likelihood of achieving biodiversity conservation goals than approaches that have been 'threat based' and have focused on maintaining the *status quo*.

Pursuit of the 'adapting mosaic' scenario would be consistent with the view that there are diminishing returns to further investment in totally protected areas (PAs) (Brown 2002; Hayes & Ostrom 2005). PAs now cover 12 percent of terrestrial habitats worldwide although less than 4 percent conform to the strict conditions of PA categories established by the International Union for the Conservation of Nature (Locke & Dearden 2005). Conservationists are struggling to defend existing PAs against external pressures. Even natural World Heritage Sites have significant levels of human activity within their boundaries (Sayer *et al.* 2000). The reality is that many of the areas conservationists have sought to protect have suffered serious degradation of their natural values, and the threats of further losses are increasing (Oates 1999; Terborgh 1999). The strategy of establishing as many paper parks as possible to block development of the major tropical forest areas seem destined to fail in the

long term. Expecting that the future populations of countries such as Cameroon and Cambodia will tolerate maintaining a quarter of their land area under strict protection seems optimistic. PAs remain of vital importance but it is becoming clear that we have to explore additional conservation options. The fate of much biodiversity will depend upon landscape mosaics where only small areas are totally protected (e.g. Zuidema *et al.* 1997; Vandermeer & Perfecto 2007). Many of these landscapes will be under decentralised management regimes driven by local civil society (Glück *et al.* 2005).

Integrated conservation and development projects (ICDPs), and ecosystem approaches are consistent in their overall aspirations with the 'adapting mosaic' scenario. Aid agencies and international non-governmental organisations (NGOs) have invested heavily in ICDPs for some 40 years (Garnett *et al.* 2007). Unfortunately, it has been difficult to demonstrate that these projects have delivered either conservation or development benefits (McShane & Wells 2004). The fundamental problem with the ICDP concept is that it ignored the reality that the quickest route out of poverty will almost always come from rapid growth of the economy coupled with democracy and equitable distribution of benefits. The growth with equity solution to poverty was central to the so-called Washington Consensus (Williamson 2000) and runs strongly counter to the local eco-development paradigm of ICDPs. ICDPs have sought to maintain or restore an idyllic rural landscape where people live in harmony with nature. They have ignored the reality that for most people greater material wealth is more important than harmony with nature.

Sustainable use can be a key component of an 'adapting mosaic'. Sustainably managed forests can provide a matrix within which PAs can be located. The economic and ecological viability of sustainable forest management for timber has been contested (Bourgeois 2008), but paying for the environmental benefits of these forests would make them viable and must provide a better economic option than pure protection. Appropriate mosaics of managed forests, PAs and more intensively used agriculture come close to the 'adapting mosaic' scenario and to reconciling the trade-offs between meeting conservation goals and improving local livelihoods. The challenge for conservation is to manage the mosaic as a system and not to allow each cell of the mosaic to be managed to meet purely sectoral ends (Vandermeer & Perfecto 2007).

We therefore see encouraging signs in the landscape approaches to reconciling conservation and development that are now being pioneered by a number of conservation and forestry agencies. However, because 'landscape' approaches remain rooted in a world of donors and projects they still carry with them many of the problems of ICDPs. They suffer from the difficulties of working across sectoral boundaries, of being driven by donor agendas and time frames, and of requiring human and in-

stitutional competencies that rarely exist in developing tropical countries.

### LANDSCAPE APPROACHES TO FOREST CONSERVATION

There are additional reasons to believe that managing biodiversity in mosaic landscapes, which we align with the 'adaptive mosaic' scenario, is appropriate for dealing with the challenges of large scale forest transformation. First, ecosystems are constantly changing, and the rate of change is increasing under the impacts of global market integration and climate change. It may be unwise to lock into that set of PAs that appear optimal for achieving biodiversity goals today when the 'goal posts' will move in the future. Human populations continue to grow and they are consuming more. The increased consumption of biofuels and agro-industrial crops and the expansion of mineral extraction will be the prime determinants of the extent and location of remaining forests. We cannot aspire to follow a rigid pre-defined goal for conservation. Ecosystems and landscapes are going to require continuous adaptation and management to respond to changing needs of human societies and changes in the biophysical conditions under which they exist. Conservation can no longer use the preservation of the *status quo* ante as its underlying conceptual paradigm.

Increasing limitations are becoming apparent in the classic PA approach. A large proportion of the world's PAs suffer from encroachment and degradation. Developing countries are often failing to provide resources for effective management. For example, deforestation within PAs in Indonesian Borneo is faster than in non-PAs (Curran *et al.* 2004). In many poor countries and in rural communities of developed countries there is often only a limited constituency for a strict protection approach.

In many nations the PA systems are overstretched already. More parks simply mean fewer resources per hectare for management. Even more worrying is the recent observation that park usage is stagnant or declining in developed countries (Pergams & Zaradic 2008). There are indications that today's children are less interested in nature oriented recreation than earlier generations (Louv 2005). These trends suggest that the broad public support for conservation that we now enjoy cannot be taken for granted in the future. If we are to develop 'safe-fail' cultures in conservation (Redford & Taber 2000) then we have to broaden our range of approaches and be better aligned with broader societal and environmental trends (Sheil *et al.* 2006).

### COULD REDUCED EMISSIONS CHANGE THINGS? IS MORE MONEY THE ANSWER?

The latest large scale conservation policy initiative is REDD; it seems to be the latest 'grand design' initiative.

However optimistic one is about REDD, it seems unlikely that it will provide enough funding to meet the opportunity costs of land for the two billion rural people who now live in poverty and the one billion of them who live in forest areas. For example, simulation models developed for Indonesian Borneo suggest that the income flows from agro-industrial development would be higher than revenues from REDD (Sandker *et al.* 2007). Even topped-up by REDD payments, the flows of benefits from natural forests are likely to be inadequate to compete with intensive soy bean, oil palm, beef or wood fiber production. Using REDD to improve the livelihoods of the forest dependent or forest dwelling poor would require financial transfers from rich countries that would be greater than anything conceivable under REDD schemes at present world carbon prices. The best route out of poverty for most poor forest dwellers will be either to migrate or to replace the forests with more productive crops.

REDD will have to address the fundamental obstacles of weak governance, poorly defined property rights and inability to enforce rules that have been the root causes of failure of earlier conservation initiatives. The challenge is to learn from past attempts to mediate these transformations and apply this learning to our next efforts. This will be the key to investing funds from REDD or other new funding mechanisms more effectively.

#### WHAT IS NEEDED TO MAKE LANDSCAPE APPROACHES WORK?

Although the conceptual underpinnings of landscape approaches are well developed (Farina 2006), the reality on the ground is that these approaches are often just spatial planning under a new name. All too often conservation landscapes are the product of 'grand design'. They are lines drawn on maps to include the agricultural land and managed forests around PAs. This form of landscape approach consists essentially of attempts by conservationists to impose their idealised wishes for the landscape onto others who might have quite different ambitions (Scott 1998). At worst the landscape approach has just been an attempt to join up PAs with wildlife corridors (Simberloff *et al.* 1992). We contend that landscapes must be understood as integrative constructs that include human, institutional, esthetic and economic attributes (Farina 2006). Landscape approaches must recognise that landscapes will continue to change. They must be based on the building of the human and social capital needed to achieve resilience (Walker & Salt 2006) and to manage change.

A landscape approach should encompass not just the biophysical resources of the area but also the people and their institutions. It will rarely be possible to predict how such a landscape will be at some point in the future but it is possible to maintain the building blocks—the species, ecosystems, soils, knowledge, cultures and economic institutions—that will be needed to retain resilience and

maximise future options (Walker & Salt 2006). In parallel we can invest in giving people the skills, motivation and competencies to champion conservation and in building the institutions that will be needed for learning and adaptive management. These institutions must be technically competent, accountable to legitimate stakeholders and able to enforce agreements, uphold rights and adjudicate conflicts.

Some natural areas are clearly of such outstanding value for global biodiversity that they should be given strict protection in perpetuity in national parks and equivalent reserves. As global public goods they should receive international financing to pay any opportunity costs of local communities. But, in view of the limitations of such financing and the current extent of existing PAs, these special areas are likely to be a relatively small core of conservation landscapes (Zuidema *et al.* 1997). We must, therefore, accept flexibility so that landscapes might adapt in a variety of ways to changes in economic opportunities, climate and societal values. We should give less emphasis to a single rigid model of a permanent landscape configuration and more to building the capacity to manage mosaics in flexible and adaptive ways to meet constantly changing objectives.

There is evidence from Europe and North America that the landscape mosaic approach can produce a good balance amongst social, economic and environmental outcomes. So-called 'ecosystem approaches' have proven their worth when they have been vigorously pursued. But they have only really proven feasible in situations with competent individual managers, strong institutions, an ability to enforce regulations and resolve conflicts, powerful civil society support, assured funding and viable economies (Sayer & Maginnis 2005).

#### THREE PRINCIPLES FOR LANDSCAPE APPROACHES

Conservation investments in biodiversity surveys to underpin 'grand design' plans must be complemented by the sustained support of the people and institutions who will mediate forest change on the ground. The serious limitations of pre-planned, time bound projects must be recognised. Threat-based approaches that attempt to preserve the *status quo* must make way for scenario-based programmes where learning and adaptation are paramount. This requires institutions that can deal with new knowledge, with changes in biophysical options and with the continuous evolution of the priorities of human societies. Conservation organisations need to improve their commitment and competence in the areas described below.

##### Scenarios, Social Learning and Adaptation

As an alternative to 'one-off' processes of spatial planning we advocate the development of adaptive manage-

ment at the landscape level based upon exploration of plausible scenarios by stakeholders. Hypotheses about future needs and opportunities can be articulated and tested over time by stakeholders working with scientists. Rather than attempting to resist development it is important to explore the full ramifications of all development scenarios and identify those that are best, or least bad, for biodiversity. Simple simulation models, visualisation and other less formal scenario development tools can greatly assist this process (Sayer & Campbell 2004; Soares-Filho *et al.* 2006). Building a consensus around a plausible set of compromises may be more effective than taking stands against developments as threats. Achieving conservation in large diverse landscapes will usually be a long term incremental process. Success indicators must measure the commitment of constituents and competence of institutions rather than the extent of areas under legal protection or the size of animal populations.

The MEA illustrates the use of such scenario-based approaches and offers a high level framework for the development of more detailed regional scenarios. Scenario development requires multi-disciplinary teams who can articulate hypotheses upon which learning can be based. Models can provide for feedback loops and a learning framework. A broad range of stakeholders must be involved in this shared, social learning. Conservation will be only achieved when entire societies change their behaviour. The lack of feedback and learning has been a weakness of previous attempts at large scale integrated approaches to conservation and development (Redford & Taber 2000).

Conservation scientists should help elaborate the scenarios and identify the environmental, social and economic implications of each. They can highlight the limitations of scientific knowledge and identify areas of uncertainty. Scientists can put into place systems for measuring progress towards desirable human and ecological landscapes. Action research on real landscapes will provide the basis for adaptive management. Processes need to be locally driven but it is also essential that strong advocates of the public goods values of biodiversity should be engaged. Conservation biologists will have to ride the thin line between analysis and advocacy (Chan 2008).

### **‘Muddling Through’ Rather than ‘Conservation by Design’**

Stakeholders will take strong positions on scenarios. Negotiations should then proceed, mediated through an equitable process. However, we should be realistic about expecting full agreement, particularly in societies with pronounced social and economic inequalities. The multi-faceted and complex nature of many conservation situations means that uncertainties and unpredictable inter-relationships abound and decision-making is difficult. Classic conservation has been a bit like classical music; it

has stood the test of time but has been passed down fundamentally unchanged. Managing a complex landscape for multiple functions is more like jazz, a constant process of learning, improvisation and adaptation (Sayer & Campbell 2004). Jazz requires just as much skill as classical music but the skill sets are different. Conservation investments should build the diverse skills and teams to deal with situations that are constantly evolving in unpredictable ways. Landscapes may be subject to long periods of slow change punctuated by abrupt transformations (Gunderson & Holling 2002). Soy expansion in the Southern Amazon, and oil palm and fiber plantations in Southeast Asia caught conservationists by surprise and rode rough-shod over conservation plans. Conservation needs institutions and tools that are able to react rapidly to deal with these emerging drivers of change. Management options need to be explored with the people whose actions will determine the future of the broader landscape matrix (Wollenberg *et al.* 2007).

In 1959 Charles Lindblom published ‘The science of muddling through’. It was destined to become a classic and ‘muddling through’ became a basic concept in the world of public policy. Lindblom characterises the rational process of policy-making as one where the first step is to ‘list all related values in order of importance’. This step is followed by a comprehensive analysis of possible policy outcomes (i.e., scenario development). With this thorough analysis in hand, the policy maker makes a choice that maximises values. ‘Muddling through’ is a process of negotiating amongst stakeholders with different objectives and in situations where there is a deficit of knowledge. Kai Lee came to similar conclusions in his classic ‘*Compass and gyroscope*’ (Lee 1993), where he emphasised the importance of having a clear view of the ultimate goals of conservation but of recognising that we cannot know in advance the best ways of reaching those goals.

Lindblom’s sequel (1979) ‘Still muddling; Not yet through’ echoes our understanding of the challenges facing conservationists today. We will rarely achieve any steady state that optimises conservation. In the world’s major tropical forest blocks finding the balance between global environmental values and local development values will be a process that unfolds over many decades. Serious investments are needed in building institutions and providing funding that can support these processes for the long haul.

The ideas of ‘muddling through’ are similar to those of adaptive management and more especially ‘adaptive collaborative management’, ‘adaptive learning’ and ‘action research’ (Armitage *et al.* 2007; Fisher *et al.* 2007). In these approaches stakeholders define goals in very general terms and all policies and interventions are treated as experiments. The experiment is successful if progress is made towards the goal. An essential element of adaptive management is that there must be a capacity to measure

progress towards those goals. Conservationists have been consistently bad about defining their goals in measurable ways. This has been a particular problem for larger scale conservation and development initiatives. Only with measurement will it be possible to make statements about whether policies or interventions have been successful or not in mediating the forest transition (Sayer *et al.* 2007; Wollenberg *et al.* 2007)

### **Building Local Capacity, Institutions and Regulations: A Basis for Learning and Adaptation**

'Muddling through' will only produce positive outcomes when institutions exist that can establish and negotiate goals and resolve disputes. Agreements have to be enforceable. These abilities to negotiate and enforce have to exist at the spatial scale of the forest landscape of concern. There need to be institutions and a policy framework which can favour sustainable resource management in situations of continually changing circumstances. Decentralising control of forest resources to local communities is advancing rapidly throughout the tropics and this can help or hinder the emergence of adaptable institutions. Historical examples from Switzerland, Canada, Nepal and more recently Indonesia have shown that decentralisation only works when there is a centralised capacity to ensure that public goods values are respected (Colfer & Capistrano 2005). Local people will have conservation objectives but they will often be quite different to those of international conservationists (Sheil *et al.* 2006). International conservation organisations will have to be the advocates of the global public goods values of biodiversity in conservation landscapes under decentralised control. As practitioners and researchers ourselves, we note with regret that one of the most serious failures of international conservation has been the failure in recent decades to develop local champions and institutions, and to define conservation in ways that are meaningful and attractive to local constituencies.

Much of the funding for forest conservation in the tropics still flows from official development assistance agencies which value the planned delivery of short term project outputs more than building long term adaptive capacity. Most of the plausible scenarios for REDD funding mechanisms will perpetuate this 'projectisation' of conservation investments. There is a real danger that they will spawn a proliferation of international consulting opportunities but will fail to engage with the messy world of forest landscape transitions.

### **CONCLUSIONS**

There is an assumption that conservation plans based upon biophysical, and to a lesser extent social and economic analysis, and adopted by governments will provide the 'grand design' for future landscapes. But these plans

often fail to confront the reality of powerful forces for change that are driven by the needs of societies for resources. The agents for these changes are entrepreneurial, opportunistic and fast on their feet. In the real world of both the public and private sectors and in conservation NGOs decisions are not taken on the basis of objective plans but rather emerge from a continuing process of negotiation and deal-making.

To achieve conservation we must invest in the people and institutions needed to engage effectively with these imperfect processes. Conservationists must challenge those whose activities drive forest transformations and continually mediate and adapt to achieve the best possible biodiversity outcomes. Local alliances will be essential and may be strengthened through clarification and protection of local resource rights. Under all scenarios funding for conservation will need to be sustained. When protection of biodiversity and other environmental services imposes opportunity costs on local people then those costs will have to be defrayed. Models and scenarios which make assumptions explicit and state testable hypotheses about costs and benefits will often reveal just how high these local opportunity costs are. Model-based scenarios can increase transparency and accountability and provide a framework for negotiation and learning.

The 'adaptive mosaic' scenario of the MEA provides a sound conceptual framework for dealing with conservation and development trade-offs in forest transition situations. It is consistent with much incipient work by practitioners in conservation landscapes (Harvey *et al.* 2008) and with successful approaches used in densely populated regions in Europe. Conservation biologists have a key role to play as facilitators, analysts and advocates (Chan 2008), but they will rarely be the ultimate decision makers. However, none of the conservation paradigms can succeed in the absence of skilled and committed people, competent and effective institutions, legal frameworks and adequate and sustainable financing.

We are driven to make these arguments by our perception that conservation organisations are investing too much in ambitious 'grand design' initiatives using purely biological criteria to elaborate idealistic plans for vast connected-up conservation networks. Most of these plans will never be realised. They are based upon the views of a minority special interest group and ignore the realities of the majority of people whose actions are driving change in tropical landscapes.

Conceptually, we must move on from the myth that there is some kind of 'steady state' idyllic end point to land use change. In reality, change will be continuous in response to changing climates, economic opportunities and societal values. REDD and similar investments will only be effective if there are institutions and people able to muddle through the inevitable forest transition. Conservation will be achieved by social movements and not by expert technicians sitting behind their Geographic In-

formation System screens. Social movements are needed to create 'adapting mosaics' that are able to continually evolve to meet the needs and opportunities of people and nature in a changing world.

### Acknowledgements

This paper draws heavily on discussions held at a conference 'Our common ground' hosted by the Faculty of Forestry of the University of British Columbia in May 2007. Participants came from conservation and resource management organisations in 24 countries. The conference was sponsored by the Canadian International Development Agency, Natural Resources Canada, Catalyst Paper Corporation, the Forest Products Association of Canada, the Moore Foundation, Pacific Resolutions Ltd., the United Nations Food and Agriculture Organization, Shell Canada, Worldwide Fund for Nature-Canada and the British Columbia Market Outreach Network. We adopted the term 'Grand Design' from an unpublished manuscript by Robert Fisher.

### REFERENCES

- Armitage, D., F. Berkes and N. Doubleday. 2007. *Adaptive co-management: Collaboration, learning and multi-level governance*. Vancouver: UBC Press.
- Bourgeois, W.W. 2008. Ecosystem-based management: Its application to forest management in British Columbia. *British Columbia Journal of Ecosystems and Management* 9(1): 1–12.
- Brown, K. 2002. Innovations for conservation and development. *The Geographical Journal* 168(1): 6–17.
- Chan, K.M.A. 2008. Value and advocacy in conservation biology: Crisis discipline or discipline in crisis. *Conservation Biology* 22: 1–3.
- Chomitz, K. 2006. At loggerheads. The World Bank, Washington, DC, USA.
- Colfer, C. and D. Capistrano. 2005. *The politics of decentralisation: Forests power and people*. London: Earthscan.
- Curran, L.M., S.N. Trigg, A.K. McDonald, D. Astiani, Y.M. Hardiono, P. Siregar, I. Caniago et al. 2004. Lowland forest loss in protected areas of Indonesian Borneo. *Science* 303(5660): 1000–1003.
- EC&MF (European Commission, Jakarta, and Ministry of Forestry, Indonesia). 2006. Capitalisation on two decades of development assistance to forestry in Indonesia. Report of a workshop sponsored by the Ministry of Forestry and the European Commission, Jakarta, Indonesia.
- Farina, A. 2006. *Principles and methods of landscape ecology*. Dordrecht: Springer.
- Fisher, R., R. Prabhu and C. McDougall (eds.). 2007. *Adaptive collaborative management of community forests in Asia*. Bogor: Center for International Forestry Research.
- Garnett, S.T., J. Sayer and J. Du Toit. 2007. Improving the effectiveness of interventions to balance conservation and development: A conceptual framework. *Ecology and Society* 12(1): 2.
- Glück, P., J. Rayner and B. Cashore. 2005. Change in the governance of forest resources. In: *Forests in the global balance-Changing paradigms* (eds. Mery, G., R. Alfaro, M. Kanninen and M. Labovikov). Pp. 51–74. Vienna: International Union of Forestry Research Organizations.
- Gunderson, L.H. and C.S. Holling. 2002. *Panarchy: Understanding transformations in human and natural systems*. Washington, DC: Island Press.
- Harvey, C.A., O. Komar, R. Chazdon, B.G. Ferguson, B. Finegan, D.M. Griffith, M. Martinez-Ramos et al. 2008. Integrating agricultural landscapes with biodiversity conservation in the Mesoamerican hotspot. *Conservation Biology* 22(1): 8–15.
- Hayes, T. and E. Ostrom. 2005. Conserving the world's forests: Are protected areas the only way? *Indiana Law Review* 38: 595–617.
- Lee, K.L. 1993. *Compass and gyroscope: Integrating science and politics for the environment*. Washington, DC: Island Press.
- Lindblom, C.E. 1959. The science of muddling through. *Public Administration Review* 19(2): 79–88.
- Lindblom, C.E. 1979. Still muddling, not yet through. *Public Administration Review* 39(6): 517–526.
- Locke, H. and P. Dearden. 2005. Rethinking protected area categories and the new paradigm. *Environmental Conservation* 32(1): 1–10.
- Louv, R. 2005. *Last child in the woods: Saving our children from nature deficit disorder*. New York: Algonquin Books of Chapel Hill.
- McShane, T. and M. Wells. 2004. *Getting biodiversity conservation projects to work: Towards more effective conservation and development*. New York: Columbia University Press.
- MEA (Millennium Ecosystem Assessment). 2005. Ecosystems and human well-being, Volume 2, Scenarios. Washington, DC: Island Press. URL: <http://www.millenniumassessment.org/en/Scenarios.aspx> (last accessed January 2008).
- Nilsson, S. 2007. *The three Fs: Food, fiber and fuel. Global development: Science and policy for the future*. Vienna: International Institute of Applied Systems Analysis.
- Oates, J. 1999. *Myth and reality in the rain forest: How conservation strategies are failing in West Africa*. Berkeley: University of California Press.
- Pergams, G.R.W. and P.A. Zaradic. 2008. Evidence for a fundamental and pervasive shift away from nature-based recreation. *Proceedings of the National Academy of Sciences* 105: 2295–2300.
- Redford, K. and A. Taber. 2000. Writing the wrongs: Developing a safe-fail culture in conservation. *Conservation Biology* 14: 1567–1568.
- Sandker, M., A. Suwarno and B.M. Campbell. 2007. Will forests remain in the face of oil palm expansion? Simulating change in Malinau, Indonesia. *Ecology and Society* 12(2): 37. URL: <http://www.ecologyandsociety.org/vol12/iss2/art37/> (last accessed 3 December 2008).
- Sayer, J.A. and B. Campbell. 2004. *The science of sustainable development: Local livelihoods and the global environment*. Cambridge and New York: Cambridge University Press.
- Sayer, J.A. and S. Maginnis. 2005. *Forests in landscapes: Ecosystem approaches to sustainability*. London: Earthscan.
- Sayer, J.A., N. Ishwaran, J. Thorsell and T. Sigatty. 2000. Tropical forest biodiversity and the world heritage convention. *Ambio* 29(6): 302–309.
- Sayer, J., B. Campbell, L. Petheram, M. Aldrich, M. Ruiz Pérez, D. Endamana, Z.N. Dongmo et al. 2007. Assessing environment and development outcomes in conservation landscapes. *Biodiversity and Conservation* 16(9): 2677–2694.
- Scott, J.C. 1998. *Seeing like a state*. New Haven: Yale University Press.
- Sengupta S. and S. Maginnis. 2005. Forests and development: Where do we stand? In: *Forestry and development* (ed. Sayer, J). Pp 11–58. London: Earthscan Press.
- Sheil, D., R. Puri, M. Wan, I. Basuki, M. van Heist, N. Liswanti, Rukmiyati et al. 2006. Recognising local people's priorities for tropical forest biodiversity. *Ambio* 35(1): 17–24.
- Simberloff, D.S., J.A. Farr, J. Cox and D.W. Mehlman. 1992. Movement corridors: Conservation bargains or poor investments? *Conservation Biology* 6: 493–504.
- Terborgh, J. 1999. *Requiem for nature*. Washington, DC: Island Press/Shearwater Books.
- UNEP (United Nations Environment Programme). 2002. *Global environmental outlook 3: Past, present and future perspectives*. London: Earthscan.

- Vandermeer, J. and I. Perfecto. 2007. The agricultural matrix and a future paradigm for conservation. *Conservation Biology* 21: 274–277.
- Walker, B. and D. Salt. 2006. *Resilience thinking: Sustaining ecosystems and people in a changing world*. Washington, DC: Island Press.
- White, A. and A. Martin. 2003. *Who owns the world's forests? Forest tenure and public forests in transition*. Washington, DC: Forest Trends and the Center for Environmental Law.
- Williamson, J. 2000. What should the World Bank think about the Washington Consensus? *World Bank Research Observer* 15(2): 251–264.
- Wollenberg, E., R. Iwan, G. Limberg, M. Moeliono, S. Rhee and M. Sudana. 2007. Facilitating cooperation during times of chaos: Spontaneous orders and muddling through in Malinau district, Indonesia. *Ecology and Society* 12(1): 3.
- Zuidema, P., J.A. Sayer and W. Dijkman. 1997. Forest fragmentation and biodiversity: The case for intermediate sized conservation areas. *Environmental Conservation* 23(4): 290–297.

Supervising editor: Lisa Curran

Received 7 May 2008. Revised 6 September 2008. Accepted 14 November 2008.

---