Wicked problems and metaforestry: Is the era of management over?

by Sen Wang¹

The world's forests have all the characteristics of "wicked problems" that are complex, tricky and thorny. Decades of sweeping changes that have taken place worldwide at various levels have resulted in the emergence of "metaforestry" which transcends the field of conventional forestry in response to the need to deal with ulterior and more fundamental problems concerning the forest. Being an overarching objective of metaforestry, sustainable forest management calls for a new line of thinking to promote collaboration in international forums concerning global forest policy.

Key words: adaptive management, criteria and indicators, ecosystem, global forest policy, sustainable forest management

Les forêts du monde ont toutes les caractéristiques des « affreux problèmes » qui sont complexes, délicats et épineux. Des décennies de changements rapides qui ont eu lieu partout dans le monde et à différents niveaux ont entraîné l'émergence d'une « méta foresterie » qui transcende le domaine de la foresterie conventionnelle en réponse au besoin de traiter les problèmes à venir et plus fondamentaux reliés aux forêts. Étant un objectif absolu de la méta foresterie, l'aménagement forestier durable fait appel à un nouveau mode de pensée pour promouvoir la collaboration au niveau des forums internationaux reliés aux politiques forestières globales.

Mots-clés : aménagement adapté, critères et indicateurs, écosystèmes, politiques forestières globales, aménagement forestier durable

Introduction

Since the 1992 United Nations Conference on Environment and Development (UNCED) which was held in Rio de Janeiro, Brazil, forest policy has been a subject of intense debate. The core issues of the debate and a series of resultant initiatives relating to sustainable forest management (SFM) have been recorded in the famous trilogies on the world's forests—"Rio+3" (Grayson 1995), "Rio+5" (Grayson and Maynard 1997), and "Rio+8" (Söderlund and Pottinger 2001). In spite of the significant contributions that these publications have made in documenting the efforts of the international community to advance the global forestry agenda, one shortcoming that is common to all three pieces is a lack of diagnosis of the problems characterizing the world's forests. But, is it fair to criticize these references for the deficiency? The answer is a resounding "No," because it is extremely difficult to make sense of the characteristics of the world's forests in the first place. The reason is simply that the world's forests constitute a "wicked problem." This paper has three objectives. First, I recall the distinctive properties of wicked problems. Second, I introduce the notion of "metaforestry" and review the conditions out of which metaforestry emerges. Third, in an attempt to answer the question whether or not the era of management is over in the context of metaforestry, I outline an alternative approach to achieving SFM. The paper ends with some concluding remarks on the new directions of global forest policy beyond "Rio+10."

What is a wicked problem?

The concept of "wicked problems" was originally proposed by Kunz and Rittel (1970) and, in particular, by Rittel and Webber (1973, 1984) in the context of social planning. As

explicated by Rittel and Webber (1973), the term "wicked" should not be understood to imply malicious intent; instead, it may be interpreted to carry the meaning similar to that of "malignant" (in contrast to "benign") or "tricky" (like a leprechaun) or "aggressive" (like a lion, in contrast to a docile lamb). Whether a problem is wicked or tame may be distinguished by at least ten properties (see Table 1).

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In contrast to tame problems, such as many of those that are found in the engineering field, wicked problems tend to arise in a social context. Wicked problems defy conventional problem-solving approaches, like the "waterfall model" which is characterized by the usual steps of problem formulation, data collection and analysis, presentation of findings, and construction of a solution (DeGrace and Stahl 1990).

The emergence of metaforestry

Over the past few decades, especially since the 1980s, the rapid pace of economic-technological progress and industrialization has transformed virtually every aspect of Planet Earth. While the major changes may be characterized by economic globalization, plurality of legitimate perspectives and social atomization (Funtowicz *et al.* 1999), the overriding theme is, clearly, a growing concern over the effects of environmental degradation on a global scale, and this concern has found expression in the universal endorsement of the sustainability principles. Hodge (2002) pointed out shifts at three levels, namely, individual, corporate and societal. First, at the individual level, the notion of "self interest" seems to be giving way to what is known as "enlightened self interest" that stresses the synchronization of self interest and group interest.

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Table 1. Ten distinctive properties of a wicked problem

1. Having no definitive formulation.
2. Having no stopping rule.
3. Solutions being not true-or-false, but good-or-bad.
4. Solutions having no immediate and no ultimate test.
5. Every solution being consequential, making it hard to learn by trial-and-error.
6. Not having an exhaustively describable set of potential, permissible solutions.
7. Every wicked problem being essentially unique.
8. Having interdependence among elements of a problem, with one element being possibly a symptom of another.
9. Involving huge discrepancy among attitudinal criteria in regard to the problem's nature and resolution.
10. The planner having no right to be wrong.

Source: Adapted from Rittel and Webber (1973).

At the corporate level, the emphasis on shareholder value is being replaced by the notion of shareholder value plus community value. This means that Friedman's (1970) well-known view that the social responsibility of business is to increase profits will need to be modified to take a broader public interest as well as locality-specific concerns into account. Finally, at the society level, the traditional preoccupation with human welfare is being augmented by a call for considerations of both human wellness and ecosystem wellness. This third aspect was recognized by Dove and Kammen (1997) who used the term "moral ecology of resource use." According to Prescott-Allen (2001), we are still in the process of moving toward the establishment of a new societal values system that gives equal emphasis to human and ecosystems well-being. As a result of these changes, the concept of sustainability has taken root in the mainstream thinking worldwide. The best evidence is that, following many rounds of highly philosophical discussions on what would constitute sustainability, the guiding principles of Agenda 21 are recorded in the 500-page United Nations program of action for sustainable development, put forth by governments of 179 countries at the 1992 UNCED (see Grayson 1995; Grayson and Maynard 1997; Söderlund and Pottinger 2001).

The world's forests have experienced unprecedented changes over the last quarter of a century. Toward the end of the 1970s and the early 1980s, the international community awoke to an alarming rate of deforestation in the tropical area (Lanly 1982). Quickly, the concerns over forest conservation spread beyond the tropics to the temperate and other regions (Maini 1990; Maini and Ullsten 1993). Prior to and during the UNCED, forest issues were so controversial that countries were sharply divided in their positions regarding the prospects of a proposed international convention on forests (Lanly 1992). Ten years have elapsed since the Rio Earth Summit and, in spite of a large number of initiatives, countries still disagree on a large number of issues and the agonizingly slow progress of the United Nations Forum on Forests (UNFF) is a case in point (Wang 2001).

How to make sense of the state of affairs in the global forest policy arena? It is, perhaps, useful to consider three trends that the world's forests have witnessed. First, in the past two decades or so, our world has undergone a departure from the forests being viewed as the raw materials merely for timber and wood products production. The multipurpose role of the forest has increasingly been recognized. As an integral part of the Earth's terrestrial ecosystems, forests provide habitat for millions of species of plants, animals and micro-organisms. Further, a consensus has emerged that sound ecological conditions are essential for sustainable socioeconomic development.

The second trend is a movement toward the socialization of forestry. If Westoby's (1987) appeal of "Making trees serve people" captured the essence of a worldwide campaign characterized by humanism in the 1970s and the 1980s, since the early 1990s an increasing number of people, institutions and social groups have turned their attention to the forest. As a result of socialization processes, forest products companies have come to realize that business decisions must be made in concert with the desires and expectations of the general public at large and of the affected local communities in particular. The same processes have heightened the sense of social responsibilities on the part of professional foresters (Binkley 1992).

The third trend is the internationalization of forestry, which has resulted in the crystallization of a forest-related feedback loop. While forest-based commodity products continue to flow from production areas to the marketplace and, ultimately, to consumers, the internationalization of forestry has forged a closer linkage between various phases of production, trade and consumption. Increasingly, consumers demand to have a say or influence on how the products may be produced and delivered.

The above trends have greatly impacted the views regarding the world's forests. First and foremost, as a result of the surfacing of new dimensions, forests are seen as an integrated system comprising trees, people, and other living organisms. In other words, forests are multi-dimensional, involving landscape, stands, sites, people-land-forest relations, and so forth. If the forest is perceived as a web of relationships, it is certainly an open system that possesses a multitude of connections with other systems of the natural and human space. Further, while forests are rooted in the interwoven nature-human relations, they also play an important role in the transformation of social relations. Thus, compared to the domain of traditional forestry, the past decade has witnessed the emergence of "metaforestry" that is far more comprehensive and complex in terms of the scope of functions and relationships.

As metaphors are helpful tools for thought, I venture to coin a new word "metaforestry" by using "meta" as a prefix to "forestry."²

²The concept of "metaforest" was raised by an anonymous writer on the Zhurnal Wiki Web site (<http://www.leuf.net/zhurnal/zw>) on June 28, 1999. This writer wrote: "...imagine a metaforest—an ecology of diverse species, inter-related concepts slowly growing together. Metaforesters attend to the health of the system, transplanting saplings to better locations, at times harvesting mature trees, and clearing underbrush away in places so that visitors can walk the well-established paths. On occasion, a fire rages and there's a chance for a radical new start. Adventurers wander far from known trails and bring back tales of wonder—reports of isolated groves, where strange and marvellous ideas have evolved in juxtaposition. New routes are cleared to them, and the process of learning and discovery continues..."

This name differs from the traditional meaning of the science of forestry, because it bases itself on principles broader than and higher than that of conventional forestry. Specifically, being the science of that which transcends the field of traditional forestry, metaforestry may be viewed as a higher science of similar nature but it deals with ulterior and more fundamental problems concerning the forest. Conceptually, metaforestry is characterized by at least three prominent features. The first one recognizes the presence of interdependencies and connections among the various functions that forests have, such as the capacity of serving as the basis for the production of many consumptive goods, the supply of a variety of non-consumptive services as well as the provision of habitat and ecological security. Secondly, metaforestry calls for a broader definition of forestry, giving rise to the need to consider forests in a broader context of sustainable development. The third feature is that metaforestry deals with a host of deliberative and reflexive issues and this point will be elaborated further below.

In recent years, the notion of sustainable forest management (SFM) has gained increasing popularity. SFM may be viewed as an overarching objective of metaforestry, because it emphasizes the integration of environmental, socio-economic, cultural and other considerations. Such integration is a key to ensuring that we maintain quality of life, without compromising the integrity of the natural environment and the ability of future generations to meet their own needs. However, among other things, SFM is characterized by the following properties: (a) difficulty in defining the concept, determining specific objectives, and delineating operational scope; (b) involving multiple stakeholders and actors who typically have conflicting interests; (c) having strong political, cultural, moral as well as socioeconomic and professional dimensions; and (d) having no clear way to judge the righteousness and adequacy of proposals and action plans. The contentious and prolonged debates on global forest policy indicate that it is nearly impossible to articulate fully the various dimensions of SFM in a concise manner. Thus, SFM may be said to have almost all of the properties of wicked problems, in addition to several unique features such as the long-term and cross-cutting nature of forest issues, the involvement of conflicting interests and the complication of multiple actors' judgement involving the welfare of future generations, and so forth.

The concept of wicked problems was first introduced to the realm of forestry by Allen and Gould (1986). Shindler and Cramer (1999) described the management of public forest lands as wicked problems when examining the effects of shifting social values in the U.S. Pacific Northwest. Rauscher (1999) reviewed the literature pertaining to ecosystem management and discussed several decision support systems to address wicked forest management problems. More recently, Ludwig (2001) affirmed that, like climate change and the protection of endangered species, forest conservation is a typical example of wicked problems. The lack of progress in the post-1992 intergovernmental forums concerning the world's forests is testimony to the wickedness of the global forest policy problems. Essentially, the international community has been unable to reach an agreement on what exactly the global forestry problems are, whose interests to serve, on what terms, and in what way. The remainder of the paper seeks to examine several issues concerning metaforestry and proposes some alternative approaches to achieving SFM.

Is the era of management over?

Ludwig (2001) used the classic "feeling the elephant" tale to describe wicked problems. That story assumes the involvement of visually impaired persons and a disproportionately massive animal. In my opinion, contemporary global forestry resembles the analogy in several ways but differs in some others. First of all, the problem with the world's forests has indeed swelled to such monstrous proportions that no one is capable of grasping it fully. Given that a wicked problem is intractable, metaforestry involves a level of complexity, which goes beyond the capacity of the forestry circle to meaningfully grapple with. Therefore, it is a scale problem—simply too big! The enormity has arisen from, among other things, the diversity of forests' functions and the multitude of linkages that these functions have with the basic needs of life. This is why countries fell short of reaching an agreement, during the 1992 Rio Earth Summit, on an international forest treaty, but agreed instead on a legally non-binding general statement of principles on the management, conservation and sustainable development of all types of forests. Strictly speaking, the tale is not entirely applicable because, unlike a huge elephant in the tropical jungle, the humongous global forestry problem is getting bigger day by day.

Secondly, metaforestry is ill-structured, with an evolving set of interlocking issues. Fundamentally, the wickedness of global forestry problems reflects the sharp differences in positions and viewpoints among countries and other stakeholders. People form a varying degree of emotional bonds with the forest, depending on the extent to which they rely on the forest for satisfying their needs. Likewise, countries differ from one another in terms of how important the forest, forest products and services are relative to the nations' economy, culture, traditions and history. Furthermore, unlike an elephant that is relatively tame and touchable, metaforestry is refractory and unruly and, in most instances, it can only be approached from a certain distance. Not surprisingly, Ludwig (2001, p.758) proclaimed recently that, given the wickedness of complex problems such as forest conservation, "the era of management is over." Of course, this is an incredibly strong statement. If Ludwig's assertion were turned into a question, my answer would be "Yes" and "No" for the following reasons.

The era of management is indeed over in the sense that the conventional timber-dominant management paradigm, which was characterized by unscrupulous and unrestricted clearcut practices, has gone down in history. In its stead, a new management paradigm laden with ecologically conscious moral principles and ethics has begun to reign on the forest landscape. For instance, similar to what Kalland (1993) described by the term "management by totemization" in the case of whaling, symbolism has found its way into forest management, and this is evident in the campaign over the protection of the spotted owl in the old-growth forests in the U.S. Pacific Northwest (Radcliffe 1992). In British Columbia, the conflict over the issue of temperate rain forest protection captured the world's attention in the early 1990s simply because old-growth forest was turned into an icon in the lens of the media and in the minds of the public (Kimmins 1997).

While the era of managing forests predominantly for timber production is over, the era of managing the forest resource base for a spectrum of values—including wood—is just on the horizon. In contrast to the conventional wisdom which focused

on a limited number of commodity products, notably timber, the new management paradigm aims at a moving target comprising multiple objectives that are largely fluid and shift along with changing societal values. These objectives may be achieved by means of pursuing more than one path.

If the philosophical underpinnings of metaforestry are difficult to conceptualize and contextualize, the methodological challenges associated with metaforestry are equally formidable. In recognition of the nature and characteristics of wicked problems, Rittel and Webber (1973) proposed an issue-based information system, which has served as the basis for the development of argumentation models. The most important argumentation elements include issues, alternatives, positions and constraints. DeGrace and Stahl (1990) suggested a number of so-called righteous solutions to wicked problems in the context of software design, arguing that the traditional "waterfall approach" needs to be enhanced through describing and evaluating all identifiable alternatives. This line of thinking is based on a proposition that wicked problems may be successfully addressed through argumentative discourse and collaboration among the stakeholders involved. Suggesting that consensus could emerge from a process of collaboratively considering alternative views, Karacapilidis and Papadias (2001) proposed an Internet-based system to promote friendly argumentation among decision makers and guide them in performing acts that reflect mutually beneficial interests.

Clearly, the era of forest management is far from over. However, since metaforestry defies conventional problem-solving techniques, a legitimate question is: What are the essential management principles that may be adopted to achieve sustainable forest practices? The basic characteristics and their implications are summarized in Table 2.

Obviously, metaforestry involves a host of dimensions and relationships, such as (a) ends vs. means, (b) substance vs. process (i.e., conceptual vs. procedural), (c) spatial (i.e., local vs. distant or global), (d) temporal (i.e., short vs. long term), (e) input vs. output, or outcome and results, and (f) performance vs. progress measurement. The key messages from Table 2 are threefold. First, metaforestry calls for the adoption of adaptive management as an overall philosophy in contemporary forest practices. As argued by Gray (1991), the wickedness of complex problems lies in the fact that iteration is required through the design and implementation processes, because human understandings of the nature and dimensions of wicked problems typically change over time. Similar to Walters and Holling's (1990) argument in favour of "updated understandings" in the context of large-scale management experiments, metaforestry involves a continuous process of learning and discovery. It is interesting to note that Rauscher (1999) favoured the use of knowledge and inspired leadership as some of the tools in ecosystem management.

As forest management objectives are often fluid, the definition of forestry problems can only evolve while possible solutions are considered and implemented. Given the complex and messy reality of the real world, seemingly neat solutions are invariably elusive. It is true that contemporary times are characterized by economism, scientism and technocracy being the prevailing ideologies (Ludwig 2001). Nevertheless, the limitations of technological and methodological tools must be recognized. For instance, in spite of the omnipresence of information technologies, these instruments alone are not

capable of solving wicked problems, hence the need to search for solutions from other avenues. A case in point is the issue of how to attain an objective measure of success for SFM. In recent years, a variety of criteria and indicators (C&I) have been used to identify and track change in assessing progress toward SFM. One noticeable example is the C&I framework developed in Canada under the Montreal Process (Canadian Council of Forest Ministers 2000). The Canadian C&I enables a good understanding of key forest values that Canadians want to protect and enhance. Each value is associated with a set of indicators to measure and report on Canada's progress toward SFM. In analogy with the anatomy of the hand, C&I may be described as a "finger and phalanx counting" approach. Specifically, each criterion is likened to a finger, with a number of indicators resembling phalanges. Those who are familiar with the anatomy of the hand will be able to point out immediately that the human hand is comprised of muscles, bones, joints, vessels, nerves, and fascia and ligaments. In comparison, the current C&I systems seem to be much simpler. While continued efforts are required to improve the existing C&I, attention also needs to be paid to the various linkages among the criteria and indicators and the need for integration is more imperative than ever before. Clearly, the prevailing C&I schemes only represent a beginning in the layout of an effective measurement system to comprehensively evaluate the wellness of forest ecosystems and other functionalities.

Furthermore, problems of forest conservation cannot be separated from the issues of equity, governance and social justice (Krishnaswamy and Hanson 1999, Ludwig 2001). Although every one agrees that SFM is aimed at noble pursuits, it is difficult for all major stakeholders to agree on what constitutes equitable and sound forest practices, because forest activities necessarily involve trade-offs between economic interests at different levels and over time. Hodge (2002) stressed that, of all the attributes relating to sustainability, the wellness of people and the environment is the most important ends against which all actions will ultimately be checked and assessed; and economy, institutional arrangements and governance are the means with which the ends may be achieved. However, the means do not work well without proper procedures, so engagement is needed to serve as a bridge in facilitating the functioning of the means to achieve the ends. This means that SFM calls for genuine collaboration. In addition to good will, especially at the political level, appropriate institutional arrangements and mechanisms are required to foster the building and improvement of relationships at all levels—conceptual, procedural and operational. Unfortunately, fragmentation constitutes a chief barrier to collaboration, as countries and other stakeholders are locked in entrenched positions, feeling convinced that their understanding of the nature of the problem is the only correct one. Naturally, the most important way to reduce fragmentation is through the willingness to pursue shared commitment and common understanding.

Conclusion

Sustainable forest management has been enshrined as a universal philosophy. However, global forest policy, with dozens of new initiatives undertaken over the past decade, cries out for new directions into the post-Rio+10 era. Countries have made great efforts in: (a) positioning the issues pertaining to the world's forests on the international political agenda, (b) connecting the forest agenda with that of poverty alleviation, trade, financ-

Table 2. Basic characteristics of metaforestry

Characteristics	Implications and Possible Approaches
1. Metaforestry involves a complex, dynamic, and open-ended system.	1. It is difficult to formulate forest problems definitively and comprehensively.
2. Metaforestry is concerned as much with the social realm as with the natural world.	2. Views concerning forestry are diverse and no single player or group has final say regarding global forest matters.
3. Metaforestry deals with deliberative and reflective issues.	3. Seek to understand SFM progressively and adopt the "learn as we go" approach.
4. Solutions are not right or wrong, but simply better or worse.	4. There is no ultimate test of a proposal or action plan.
5. Local circumstances are complex and unique, which favours location-specific solutions.	5. Solutions are preferably custom designed and fitted; attempts at globally optimum solutions are discouraged.
6. Problem-solving processes end when resources run out.	6. Seek to do the best possible job with the resources available.
7. Metaforestry is information-intensive.	7. Take action when all relevant information has been fully utilized.
8. Metaforestry stresses integration.	8. Pay attention to connections and linkages.

ing and others, and (c) integrating the forest sector with other sectors of the economy more fully. Given that the world has entered an era of metaforestry, policy makers, practitioners and others need to envision SFM beyond the narrow confines of conventional forestry. It is not surprising that the international community has been unable to specify the forestry problem, especially at the global scale. It may be argued that we are faced with a completely new ball game, which is being played in an ill-bordered open field, with the rules of the game yet to be decided.

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