

Sustainable forest development in Mexico: a hierarchical system of criteria and indicators

C. Luján Álvarez, J.M. Olivas García and J.E. Magaña Magaña

A four-tier system of principles, criteria, indicators and verifiers was designed for evaluating progress towards sustainable forest development and tested in a model forest programme.



Strategic evaluation is a basic and essential component of programmes aimed at sustainable forest development.¹ Its purpose is to monitor progress in achieving objectives so as to enhance the chances of success either by guiding or correcting the process, or by changing the strategic plan (Sharplin, 1985). Strategic evaluation also assists in defining, identifying and detecting changes and dynamics within the system that favour sustainable development. The process of strategic evaluation must itself be dynamic, because organizations work in dynamic environments in which both internal and external conditions can change drastically and the organizations need to be able to react swiftly to take any necessary corrective action to ensure progress towards sustainable development (David, 1987).

This article describes a study carried out in Mexico to establish a hierarchical system of principles, criteria, indicators and verifiers to measure the progress of sustainable forest development in Mexico's cool temperate forest regions. The system was based on national and international benchmarks (including the Montreal Process on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests outside Europe, in which Mexico participates) and adapted for the social, cultural and ecological conditions within the reference area. It was then used in a strategic evaluation of sustainable development in the Chihuahua Model Forest Programme, in the Tarahumara range in the State of Chihuahua, Mexico. This

110 067 ha area comprises seven forest *ejidos* (communal landholdings) and has a population of 22 417 inhabitants.

A participatory strategy underpinned all decision-making in the study. The system was developed through partnership between forest communities and *ejidos* and a multidisciplinary team of researchers and experts working in forest development.

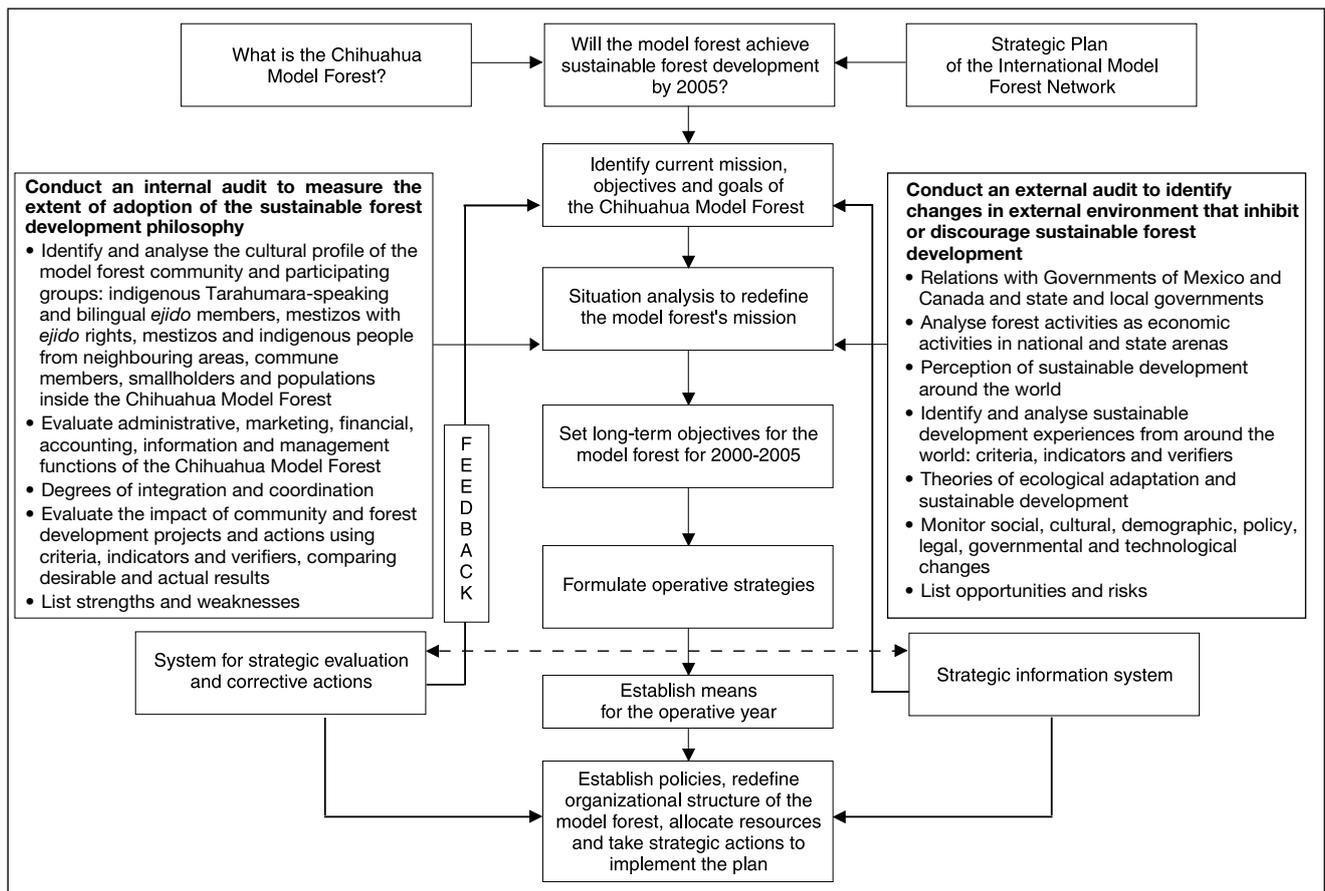
DEVELOPING AND IMPLEMENTING THE MODEL

To construct the strategic evaluation model and hierarchical system, the researchers formulated a concept of sustainable development specifically for communities living in cool temperate forest regions in Mexico (Luján Álvarez and Magaña Magaña, 1999). The concept took into account the social, economic, cultural and ecological conditions of these regions. It included conservation and improvement of existing natural resources and the environment. It also recognized the central role of the people of forest communities in designing, implementing and controlling development plans, programmes and projects through an active, participatory decision-making process. The specific model designed for the strategic evaluation of the Chihuahua Model Forest Programme is shown in Figure 1.

Once the model was designed, a participatory workshop was held which brought together *ejidos*, forest communities and experts from various organizations working in the area to provide feedback on the components of the hierarchical system (Luján Álvarez, Olivas García and Magaña Magaña, 2001). The participants analysed and validated the hierarchical system and its indicators in terms of the community's vision of a desirable future. The workshop further defined the weighting that would be used to establish the contribution of

Concepción Luján Álvarez, Jesús M. Olivas García and José Eduardo Magaña Magaña are Research Professors in the Department of Forestry and Agricultural Sciences of the Autonomous University of Chihuahua, Delicias, Chihuahua, Mexico.

¹ "Sustainable forest development" is defined in this article as a dynamic process of interaction between the human dimension and the forest ecosystem and environment, and of its development with a vision of sustainability.



1

Strategic evaluation model for the Chihuahua Model Forest Programme

each component in the system to sustainable development.

The model was designed to be flexible and dynamic for potential application in other regions, nationally and globally.

Hierarchical system

A four-tier system was adopted for the evaluation of sustainable development within the community. Its components were:

- principles of sustainable development;
- criteria of sustainable development;
- indicators derived from criteria;
- verifiers to measure specific strategic actions, whose qualitative or quantitative values allow comparison of results over time.

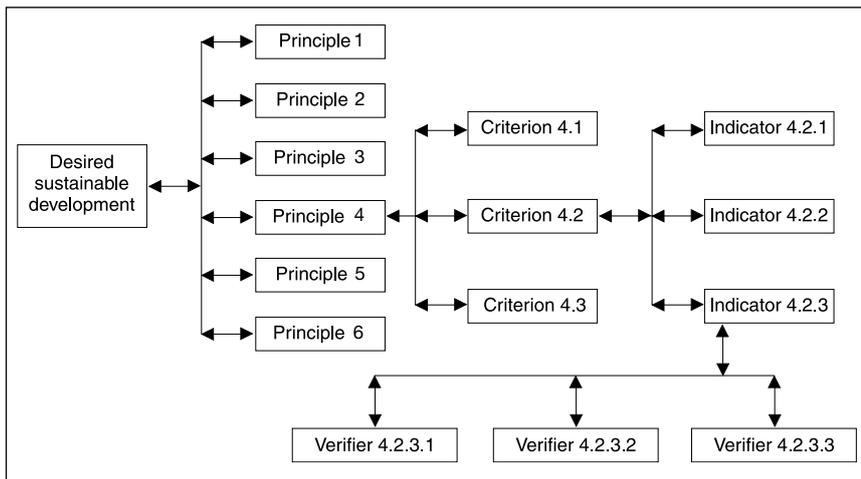
The next step was to identify the principles, criteria, indicators and verifiers covering the following three areas of evaluation: socio-economics; ecology and the environment; and community culture and self-management. Each of these three areas has its own respective principles of sustainability, just as each principle has its own criteria, each of which has its indicators and, lastly, its relevant verifiers (Figure 2).

A principle provides the framework for sustainable forest development. It constitutes a fundamental law or truth as the basis for a rationale or action, and provides the justification for the criteria, indicators and verifiers generated (Prabhu, Colfer and Dudley, 1999). For the purposes of the study, a principle

was considered an achievable goal in the social and ecological process of sustainable development.

The hierarchical system in the evaluation model comprised the following basic principles of sustainability.

- **Principle 1: Respect and concern for community life favour sustainable development.** This is an ethical principle. It means that development should not take place to the detriment of other external groups not linked to the community in question.
- **Principle 2: The harmonious development of people, natural resources and the environment is**



2
**Hierarchical system for
the strategic evaluation of
sustainable development**

Model Forest community was measured by comparing community performance with desirable performance.

Data collection

Surveys were designed and conducted to gather data from primary and secondary sources to characterize the socio-economic, cultural and self-management aspects of the various development-linked sectors in the area covered by the programme. A questionnaire was designed to collect data for each of the verifiers of the socio-economic principles through personal interviews. The statistically determined sample for the survey included 150 people. Interviewers received training to ensure the quality and consistency of the data-gathering operation.

The researchers characterized the ecological and environmental aspects of the area through historical analysis of forest management in the area based on existing documents and reports. In the participatory workshop, the researchers, together with the *ejidos* and forest communities, defined the desirable level of sustainable development for each of the three areas of the hierarchical system.

Once the surveys were completed, the data on the variables under study were assembled in an Excel database.

Comparison of actual versus desirable performance

The data collected were used to obtain the values for each verifier within the hierarchical system. Each verifier was then qualified in terms of its contribution to sustainable development and rated according to the following scale: 90 to

what sustains the quality of human life. What is really demanded of development is that it better the quality of people's lives. Economic growth is an important component of development, but cannot be a goal in itself. Sustainable development is only real if it makes the life of the community better in every sense.

- **Principle 3: Conservation and protection of biodiversity and the environment favour sustainable development.** Conservation-based development necessarily includes deliberate action to protect the structure, functions and diversity of ecosystems and of the environment.

- **Principle 4: Forest ecosystem management must not exceed the capacity of the ecosystem.** The limits of ecosystem functioning vary from one ecosystem to another. Policies need to bring the number of people and their livelihoods into balance with the capacity of the ecosystem. This capacity must be developed through careful management designed to provide quality goods and services in a sustainable way. Furthermore, the continuous interaction among people, natural resources and the

environment must be managed to cause the least possible damage to the ecosystem.

- **Principle 5: The culture of the community must be in line with sustainable development.** People need to re-examine their values and behaviour. The community should promote values that support the new ethics, and do away with those incompatible with a sustainable way of life.

- **Principle 6: Community self-management and ownership are fundamental for sustainable development.** Properly informed, motivated, committed and responsible communities can and must contribute to the decisions affecting them and play a crucial role in sustainable development.

A set of criteria, indicators and verifiers was defined for each principle, and these will enable reliable measurements to assess progress towards sustainable development (Table 1).

APPLYING THE HIERARCHICAL SYSTEM IN STRATEGIC EVALUATION

Using the above structure, the level of sustainable development in the Chihuahua

TABLE 1. Example of the structure and content of the hierarchical system for the strategic evaluation: Principle 1

Principle	Criterion	Indicator	Verifier
1: Respect and concern for community life favour sustainable development	1.1: Autonomous community decision-making permits sustainable development	1.1.1: Mechanisms for decision-making offering community autonomy	1.1.1.1: Number of mechanisms for decision-making 1.1.1.2: Type of mechanisms for decision-making 1.1.1.3: Operation of the mechanisms
		1.1.2: Absence of participation of external sectors in making decisions fundamental to community life	1.1.2.1: Types of community action undertaken in the absence of external intervention in decision-making
		1.1.3: Internal organization favouring autonomy	1.1.3.1: Identification of organizational aspects that favour autonomy
		1.1.4: Community organizational structure respected	1.1.4.1: Identification and classification of evidence from local people and external institutions
		1.1.5: Community responsible for management and integrity of natural resources	1.1.5.1: Type of responsibilities of providers of technical forest services in natural resource management

TABLE 2. Example of the calculation of verifiers, indicators, criteria and principles of sustainability: Principle 1

Level in hierarchical system	Ideal contribution to sustainable development (%)	Actual contribution (%)	Progress towards ideal (%)
Verifier			
1.1.1.1: Number of mechanisms for decision-making	40	36	36/40 = 90
1.1.1.2: Type of mechanisms for decision-making	30	27	27/30 = 90
1.1.1.3: Operation of the mechanisms	30	18	18/30 = 60
Total	100	81	
Indicator			
1.1.1: Mechanisms for decision-making offering community autonomy	24	$24 \times 0.81 = 19.4$	81 (sum of the actual contributions of the three verifiers that correspond to Indicator 1.1.1)
Criterion			
1.1: Autonomous community decision-making permits sustainable development	30	$30 \times 0.65 = 19.5$	65 (sum of the contributions of the five indicators that pertain to Criterion 1.1)
Principle			
1: Respect and concern for community life favour sustainable development	18	$18 \times 0.64 = 11.5$	64 (sum of the contributions of the four criteria that pertain to Principle 1)

100 percent was considered excellent; 80 to 90 percent, good; 65 to 80 percent, average; 50 to 65 percent, poor; and less than 50 percent was considered to indicate no development (Luján Álvarez, Olivas García and Magaña Magaña, 2001). For each verifier comparison was then made with the “ideal” sustainable development model to deter-

mine the actual level of progress towards sustainable development (Table 2). The sum of the contributions of the verifiers provides an indication of progress related to each indicator, the sum for the indicators provides an indication of progress related to the criteria, and so on.

In this way a sustainable development profile was developed based on

the comparison of actual versus ideal for each of the three substantive thematic areas – socio-economics, ecology and the environment, and culture and community self-management – and their corresponding principles of sustainability (Table 3). For example, in the area of socio-economics, the actual value (25.7 percent) represents 64.3 percent of the

TABLE 3. Ranking of sustainable development in the Chihuahua Model Forest Programme: profile divided by subject areas and their relevant principles of sustainability

Area/principle	Ideal (%)	Actual (%)	Progress towards the ideal (%)	Sustainable development ranking
Socio-economics	40	25.7	64.3	Poor
Principle 1	18	11.5	64.0	Poor
Principle 2	22	14.2	64.5	Poor
Ecology and environment	30	23.8	79.3	Average
Principle 3	9	7.0	77.4	Average
Principle 4	21	16.8	79.8	Average
Culture and community self-management	30	21.5	71.6	Average
Principle 5	15	10.4	69.3	Average
Principle 6	15	11.1	74.0	Average
Total	100	71.0		Average

ideal value (40 percent) – a poor ranking according to the above scale.

Generally speaking, this profile showed that the present level of progress towards sustainable forest development in the area under the programme was only average. Thus the programmes and projects implemented by the Chihuahua Model Forest Programme from 1994 to 1999 had not yet had the desired impact in favour of sustainable development. On this basis the community established new strategic actions for future sustainable development.

CONCLUSIONS

The prototype model and hierarchical system for the strategic evaluation of sustainable forest development elaborated in this study provides a solid basis for future development.

The following aspects were fundamental to the effectiveness of the strategic evaluation process: the analysis of the specific socio-economic, environmental and cultural situation (in this case, the Chihuahua Model Forest Programme); the design of the evaluation model and the strategic evaluation system, with the

use of “ideal” weightings for sustainability principles, criteria, indicators and verifiers, defined through a broad-based participatory process; the participation of the community and development-linked institutions operating within the area covered by the programme; and examination of the actual values obtained in the application of the model.

An additional observation is that although the working philosophy of the Chihuahua Model Forest Programme includes the concept of “sustainable development”, the community at large did not grasp the concept well enough to favour sustainability-oriented community development. Furthermore, the community had not participated actively in the design and implementation of sustainable development plans, programmes and projects to meet its needs, desires and preferences. Efforts should therefore be made to strengthen, and perhaps to modify, the ideas and attitudes of local people to heighten their sense of responsibility, commitment and involvement in the implementation of sustainable development projects. ♦



Bibliography

- David, F.R.** 1987. *Concepts of strategic management*. Toronto, Canada, Merrill Publishing Company.
- Luján Álvarez, C. & Magaña Magaña, J.E.** 1999. *Concepto de desarrollo sustentable*. Delicias, Chihuahua, Mexico, Department of Forestry and Agricultural Sciences, Autonomous University of Chihuahua.
- Luján Álvarez, C., Olivas García, J.M. & Magaña Magaña, J.E.** 2001. Evaluación estratégica del desarrollo sustentable en el área de influencia del Bosque Modelo Chihuahua. In *Taller Participativo para la Consolidación del Sistema de Información Estratégica: Principios, criterios, indicadores y verificadores*. Technical Report. Delicias, Chihuahua, Mexico, Department of Forestry and Agricultural Sciences, Autonomous University of Chihuahua.
- Prabhu, R., Colfer, C.I.P. & Dudley, R.G.** 1999. *Guidelines for developing, testing and selecting criteria and indicators for sustainable management*. Criteria and Indicators Toolbox Series No. 1. CIFOR.
- Sharplin, A.** 1985. *Strategic management*. New York, NY, USA, McGraw Hill. ♦

Forest area covered by management plans: global status and trends



Extracted from the paper "Forest area covered by management plans: global status and trends", by Mette Løyche Wilkie (FAO, Rome), Hassan Abdel-Nour (FAO Regional Office for the Near East, Cairo, Egypt), Carlos Marx Carneiro (FAO Regional Office for Latin America and the Caribbean, Santiago, Chile), Patrick Durst (FAO Regional Office for Asia and the Pacific, Bangkok, Thailand), D. Kneeland (FAO, Rome), Pape D. Kone (FAO Regional Office for Africa, Accra, Ghana), C.F.L. Prins (Timber Branch, UNECE Trade Development and Timber Division, Geneva, Switzerland), C. Brown and T. Frisk (consultants), presented at the XII World Forestry Congress.

In the past two decades, new initiatives have stimulated positive changes in forest management throughout the world. However, reliable and comprehensive information on the status and trends in forest management worldwide is not readily available. A recent study by FAO aimed to help fill this gap. It indicated that the area of forest managed in accordance with a forest management plan, irrespective of management objective, has increased in most regions within the past 20 years.

The study was based on information compiled by FAO for the Global Forest Resources Assessment 2000 (FRA 2000), supplemented and updated with data provided by countries to the six FAO Regional Forestry Commissions in 2002 and information obtained through a literature search and contacts in individual countries.

For FRA 2000, the industrialized temperate/boreal countries reported on the area of forest managed in accordance with a formal or informal management plan, and they were invited to include forest areas where a decision had been made not to manage them at all. The developing countries, on the other hand, reported on the area of forest managed in accordance with a formal, nationally approved forest management plan. Because of these different definitions, as well as a lack of comprehensive information from developing countries, it was not possible to derive a global figure nor directly to compare the results from industrialized and developing countries. Nevertheless, it was possible to draw a number of conclusions.

All industrialized countries and countries with economies in transition (55 in total) provided national-level information for FRA 2000. The results indicated that 89 percent of forests in these countries were being managed "according to a formal or informal management plan" or had been designated as areas where no active management should take place. As regards trends in area of forest under management plans, a direct

comparison with previous estimates was not possible because of slightly different definitions used over time. However, the situation in industrialized countries and countries with economies in transition appears to have remained stable or to have improved over the past 20 years.

As an example, 19 countries in Europe provided information on the forest management situation in the early 1980s, 1990 and 2000. In 1980, 64 percent of closed forests were "managed according to a forest management plan"; in 1990, 71 percent of forests were "under active management"; and in 2000, 95 percent of the forest area was reported to be "managed in accordance with a formal or informal management plan" in these countries.

Although information was available from most of the forest-rich countries of Latin America and Oceania, national information is still missing from quite a few developing countries, including countries accounting for almost 60 percent of the forest cover in Africa and 51 percent of the forest cover in Asia (see Table). Data from the 49 developing countries for which information was available indicate that at least 255 million hectares, or about 12 percent of the total forest area of all developing countries, were covered by a "formal, nationally approved forest management plan covering a period of at least five years" as of the end of 2002.

Regarding trends over time for developing countries, the lack of comprehensive information and the use of different definitions over time makes an analysis difficult. However, a study of 76 tropical countries undertaken as part of FRA 1980 estimated that 42 million hectares of forest in these countries were subject to "intensive management for wood production purposes". Information received from most of these countries by 2002 indicated that they embraced at least 246 million hectares of forests "managed in accordance with a formal forest management plan of a duration of at least five years". Most, but not

Region	Number of countries/areas	Countries and areas with national-level data	
		Number	% of region's forest cover
Africa	56	16	41
Asia	49	22	49
Europe	39	39	100
North and Central America	34	13	99
Oceania	20	3	98
South America	14	11	94
World	212	104	80

all, of these forests were being managed for wood production purposes.

An earlier study by the International Tropical Timber Organization (ITTO) (Poore *et al.*, 1989) estimated that a maximum of 1 million hectares of forest in 17 tropical timber producing countries were being managed sustainably for wood production purposes in 1988. In 2002, more than 141 million hectares of forests in these 17 countries were reportedly "managed in accordance with a formal forest management plan". This figure includes forests managed for a variety of management objectives, not only wood production. However, 4.2 million hectares of production forests in these countries have now been certified by third parties, clearly indicating gains in area managed over 1988.

It must be emphasized that the total area reported to be subject to a formal or informal forest management plan is not necessarily equivalent to the total area of forest under sustainable forest management. The FAO study does not indicate whether the plan is appropriate, being implemented as planned or having the intended effects. Some areas reported as being covered by a management plan may, therefore, not be sustainably managed, while other areas not currently under a formal management plan may be.

All of the ecoregional processes on criteria and indicators for sustainable forest management, except for the Montreal Process, include an indicator on the area of forest cov-

ered by a management plan. These processes are expected to help fill information gaps and harmonize definitions for a number of important forest management indicators, permitting more comprehensive future assessments of the status and trends in forest management at the country and ecoregional levels.

Bibliography

- Poore, D., Burgess, P., Palmer, J., Rietbergen, R. & Synnott, T.** 1989. *No timber without trees – sustainability in the tropical forest – A study for ITTO*. London, UK, Earthscan.