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Building local capacity for the application of the simulation model SYMFOR to forest management in Brazil

Belem, Brazil

April 2003

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Abbreviations

Abbreviation	Definition
DFID	Department for International Development
SYMFOR	Silviculture and Yield Management for tropical Forests. (Growth and yield model)

1 Introduction

1.1 Background

1.1.1 The purpose of the consultancy was to build local Brazilian capacity to apply the SYMFOR growth simulation model to support forest management in Brazil. SYMFOR is a spatially explicit, individual-based model of forest growth and yield. The version of SYMFOR for Brazil (Phillips *et al.*, 2002a; Phillips *et al.*, 2002b) was developed under previous consultancies for the Dendrogene project (Phillips, 2002a; Phillips, 2002b). This work followed on from an earlier consultancy making recommendations on the uptake of computer tools to support forest management in Brazil and Guyana (van Gardingen, 2000).

1.1.2 The development and calibration of the spatially explicit, individual-based SYMFOR model (Silviculture and Yield Management for tropical FORests, http://www.symfor.org) generated one version of the model for application on permanent sample plots (typically at a scale of 1 ha) and another version to work at larger spatial extents linked with the Eco-Gene simulation model for population genetics (Phillips, 2002c).

1.1.3 The final report of the consultancy to develop the Brazilian versions of SYMFOR (Phillips, 2002a) identified a series of next steps relating to the ongoing development, implementation and uptake of the model. These included expert review of the species groups developed for the model and the establishment of a series of pilot studies to promote uptake.

1.1.4 The Dendrogene project held a workshop to review the species grouping in December 2002 resulting in a report (Dendrogene, 2002) recommending a number of changes to membership of the species groups for minor species (nominally, those with less than 20 trees in the Tapajós dataset). The consultant was asked to review this report and the implications of application of suggested changes.

1.1.5 The Dendrogene project accepted the recommendation that the promotion of uptake of the SYMFOR model should be done in partnership with other organisations. Preliminary discussions had been held with the research NGO Imazon, based in Belem. From these discussions, the project had identified an individual (Mr Denis do Valle) who could act as a promotion officer through a formal link between Imazon and Dendrogene / Embrapa. The consultants visit was timed so that Denis do Valle could be given preliminary training to present SYMFOR to other potential partners in a series of meetings to build the uptake partnership.

2   Building a Uptake Partnership

2.1   Development of an Uptake Partnership

2.1.1   A meeting to discuss methods and partnerships to promote uptake of SYMFOR in Brazil was held on 8 April 2003. Participants at this meeting are listed as Table 1.

Participant	Organisation
Denis Ribeiro do Valle	ESALq
Edson Vidal	Imazon
Ian Thompson	Embrapa-DFID
Jimmy Grogan	Imazon
Mark Schultz	Imazon
Natalino Silva	Embrapa
Paul van Gardingen,	University of Edinburgh

Table 1 Participants at the uptake partnership meeting, 8 April 2003.

2.1.2   Denis do Valle presented a historical overview of SYMFOR and its potential application in Brazil. The presentation stressed the need to move from model development through to application and outlined some of the principle steps in the uptake process. It was stressed that SYMFOR represents a tool designed to address strategic questions such as the optimal intensity of logging and length of cutting cycle. Key points in the presentation included:

- The desired outcome from the meeting was an agreed strategy between (and identifying) key institutions on how to promote the use of simulation modelling to support forest management in Brazil.

- The development of uptake partnership through the development of a number of pilot studies. This would involve the identification of users of the tools and clients for knowledge generated through application of models.

- Working with clients to define realistic questions to be addressed in the pilot studies.

- Increasing local (Brazilian) ownership of the process and outputs (including the Brazilian version of SYMFOR).

2.1.3   Outcomes from the meeting are reported fully in minutes of the meeting. Key points are repeated here:

2.2   Partners and clients for the pilot studies

2.2.1   A number of potential partners were identified to support the pilot studies. These included Embrapa, Imazon, the Dendrogene project (DFID), ITTO project and Promanejo. Clients for the knowledge generated by the studies will include Ibama for regulations and evaluation of plans, MMA, certifying and training (educational) organisations.

2.2.2   It was agreed that selected clients should be involved in the implementation of the pilot studies. It was noted that the implementation of Brazil's National Forest

Programme (PNF) would generate demand for the results of the pilot studies and opportunities to apply this knowledge to support improved forest management.

2.3 Partnership with Imazon

2.3.1 A number of meetings were held involving staff from Imazon to discuss opportunities for the NGO to coordinate the uptake activities and pilot studies. It was suggested that Denis Do Valle could be employed by Imazon under contract to Embrapa/Dendrogene as the promotion officer with responsibility for the uptake of simulation modelling. It was agreed that Imazon would have further discussions with Denis do Valle to determine his availability (likely from July 2003) before entering into contractual arrangements with the Dendrogene project.

2.3.2 Imazon's staff stated that it will be important to ensure that the study is linked to core activities for the organisation. As such there was a desire to ensure that there was a significant research component to the work. Imazon's staff suggested that their role should be identified as the provision of technical facilitators for the pilot studies and uptake activities. The discussions identified opportunities relating to:

- Validation of the model for different sites and forest types.

- Extension of the model to application for Mahogany.

- Development of an appropriate economic module for application in Brazil

2.4 Timetable of implementation

2.4.1 There was limited discussion about a proposed timetable of implementation of the uptake activities including the pilot studies. It was agreed that priority should be given to promoting the simulation model and the pilot studies to a wider range of stakeholders. A meeting on continuous forest inventory to be held in Brasilia on 15/16 May was identified as the first opportunity. Natalino Silva was given the responsibility place SYMFOR and the pilot studies on the agenda of this meeting. Denis do Valle was asked if would be able to make a short presentation at this meeting. Another opportunity identified was the botanical meeting in Belem scheduled for early July 2003. The consultant was asked to provide suitable material to support these presentations.

Recommendation
1   Visual materials should be provided to support the continuous inventory meeting in Brasilia scheduled for 15/16 May 2003 and the botanical meeting in Belem scheduled for July 2003.
P. van Gardingen *April 2003*

2.4.2 It was agreed that the formal programme of work for the promotion officer and external consultant would be reviewed after the May continuous inventory meeting. It was suggested that the promotion officer would commence work in July 2003, and that the consultant would be able to support the process remotely from Edinburgh in advance of a next visit proposed for June 2003.

Recommendation
2   The work programme for the promotion officer and external consultant will be reviewed by the Dendrogene project manager to agree dates for inputs to support the uptake activities.
Dendrogene Project *May 2003*

2.5 Other promotion activities

2.5.1 A session with the title of *Evidence-based forest management in tropical South America* has been arranged as a session of the Association of Tropical Biology meeting on *Biotic Interactions in the Tropics: their Role in the Maintenance of Species Diversity* to be held in Aberdeen during July 2003. It was agreed that the Dendrogene project will present one paper at the meeting and that Milton Kanashiro will chair a round-table discussion during the session.

2.6 Funding the pilot studies and implementation

2.6.1 Opportunities for funding the uptake process was discussed during the consultancy. The Dendrogene project will provide resources for the promotion officer and external consultancy. Potential sources include:

- ITTO Project
- Promanejo
- World Bank (Brazil Office)
- World Bank / UNDP Global Environment Fund (GEF)
- Interamerican Development Bank (IADB)
- PROFOR (World Bank, Programme on Forests, previously UNDP)
- FAO National Forest Programme Facility (NFPF)
- European Union Tropical Forest Budget line and Framework 6

2.6.2 It was agreed that additional potential funding partners should be approached by the Dendrogene project and the consultant to examine and develop opportunities.

Recommendation
3   Dendrogene project staff and the consultant will approach selected potential funding partners to discuss opportunities for additional support for the uptake process *Dendrogene project / P. van Gardingen*   *July 2003*

3 Model Development and Implementation

3.1 Background

3.1.1 A meeting was held to discuss issues relating to the implementation of the pilot studies on 9 April 2003, participants are listed in Table 1. This meeting discussed issues relating to the implementation and application of SYMFOR in Brazil. Issues raised during this meeting were taken further during a series of individual meetings and the final outcomes of these discussions are reported here.

Participant	Organisation
Carlos Koury	ESALq
Carmen Garcia	CIFOR
Denis Ribeiro do Valle	ESALq
Ian Thompson	Embrapa-DFID
Jimmy Gorgan	Imazon
José do Carmo A. Lopes	Embrapa
Luke Watson	Embrapa-DFID
Marcio Sales	Imazon
Mark Schultz	Imazon
Milton Kanashiro	Embrapa
Natalino Silva	Embrapa
Olegario P de Carvalho	Embrapa
Paul van Gardingen,	University of Edinburgh
Paulo Contente	UFRA
Paulo van Breugel	Imazon
Plinio Sist	Cirad

Table 2 Participants at the uptake partnership meeting, 8 April 2003.

3.2 Promoting local ownership. A new name for SYMFOR in Brazil

3.2.1 It was agreed that adopting a new name that is specific to Brazil would help to engender a sense of local ownership for the model and uptake process. This report continues to use the name SYMFOR to describe the model.

Recommendation
4   The Dendrogene project will ask for suggestions for a new name for the Brazilian version of SYMFOR. *Dendrogene Project*   *April 2003*

3.3 Developing a Brazilian version of SYMFOR

3.3.1 It was agreed that the SYMFOR user interface should be translated into Portuguese and that the main html help-files would also be implemented. Examination of the code and comparison with the recently completed process to generate a dual language

version of TREMA suggested that there were issues relating to software maintenance that need to be resolved before the full translation commences. It was agreed that a trial would be completed to translate the main menu of the SYMFOR model manager to be implemented by Dendrogene staff (Artur Teixeira).

Recommendation
5 The SYMFOR user interface and dialogues will be translated into Portuguese commencing with a trial of the main model manager interface. *Artur Teixeira*   *June 2003*
6 Issues relating to the software maintenance of a Portuguese version of SYMFOR need to be resolved before the full interface is translated. *P. van Gardingen*   *April 2003*

3.3.2   The Brazilian version of SYMFOR should be distributed as a full installation version to include the new menus, customised displays and management models.

Recommendation
7 A Brazilian version of the SYMFOR distribution file should be developed and distributed. *Artur Teixeira*   *June 2003*

3.4   Ecological species groups

3.4.1   There was considerable discussion about the ecological groups that had been developed as part of the local implementation of SYMFOR (Phillips *et al.*, 2002a; Phillips *et al.*, 2002b) and then further discussed at the meeting hosted by the Dendrogene project in December 2002 (Dendrogene, 2002). It was agreed that the final list of suggested changes to the groups would be implemented to evaluate the potential impact on the model to determine if this would require recalibration of components of the model. The term ecological group caused some confusion with local stakeholders and it is suggested that an alternative such as growth pattern group might be a more acceptable alternative.

Recommendation
8 Modifications to the ecological species groups suggested by the review meeting are to be implemented to determine their impact on the calibration of SYMFOR *P. van Gardingen*   *June 2003*

3.5   Utilisation groups

3.5.1   The SYMFOR model requires a separate grouping of commercial or utilisation groups. This information was not available when the model was developed in 2002 and a temporary grouping was developed through analysis of the species recorded as having been harvested as part of the Tapajós experiment.

3.5.2   It was agreed that this grouping needs to be improved with more extensive data derived from records of industrial exploitation. It was suggested that it would be appropriate to develop three utilisation groups and that each group should be linked to an indicative minimum cutting diameter.

Recommendation
9 The Dendrogene project will provide data to derive a new list of commercial species relevant to application of SYMFOR in the Brazilian Amazon. *I. Thompson*   *April 2003*

3.6   Management Options

3.6.1   It was agreed that a set of realistic management models (specifications) need to be distributed with the Brazilian version of SYMFOR. An initial set will be developed based on details shown as Table 1 once the data for utilisation groups has been made available (Recommendation 9).

Yield regulation	Cutting cycle	Notes
Maximum 30 m^3 ha^{-1}	30 years	
Maximum 30 m^3 ha^{-1}	20 years	
Maximum 10 m^3 ha^{-1}	10 years	Suitable for community forest management, very low impact skid trails

Table 3 Suggested management models for the Brazilian version of SYMFOR.

Recommendation
10   A set of realistic management models will be developed to be distributed with the Brazilian version of SYMFOR
P. van Gardingen   *June 2003*

3.7   Research questions

3.7.1   A number of potential research questions were discussed with local stakeholders.

Validation or development for other sites and species

3.7.2   The need to implement the model for use at new sites which may involve other species. The first step in this process will be to identify and characterise available datasets.

Recommendation
11   The model promotion officer should work with potential research partners to identify datasets representing new locations for the application of SYMFOR in Brazil
Promotion Officer   *July 2003*

Recruitment module

3.7.3   The Brazilian version of SYMFOR was developed for using the Tapajós dataset of permanent sample plots which contain data with a minimum diameter limit of 5 cm. Potential users expressed concern that the same level of detail will not be available for other locations. The consultant was asked to investigate options for implementing a Brazilian version with a minimum diameter limit of 10 cm.

Economic module

3.7.4   The application of SYMFOR in Indonesia used an external economics module developed by an associated European Union Project (Dadang Fadilah, 1997). Options for developing a similar module to be linked with the application of SYMFOR in Brazil was discussed. The consultant suggested that two economic models distributed by FAO are evaluated (see http://www.fao.org/forestry/planning). These are based on work in Indonesia (funded by DFID) and Suriname (funded by FAO).

3.8   Publication of Ecogene paper.

3.8.1   A draft academic paper describing the linkage between SYMFOR and Eco-Gene was discussed. It was agreed that the consultant will send comments on the draft to Dendrogene staff for comment.

Recommendation
12   Comments on the draft academic paper on linking SYMFOR and Eco-Gene should be sent to Dendrogene staff to produce a final version for submission.
P. van Gardingen   *April 2003*

4   Training

4.1.1   The consultant provided training to Denis do Valle in the design and basic application of the SYMFOR framework and background information on the application of SYMFOR in Indonesia and Guyana. This was combined with assistance in the preparation of the two presentations delivered during the meetings held at Embrapa.

4.1.2   Additional training on the use and application of the SYMFOR in Brazil was provided to Luke Watson (Embrapa-DFID), Fred Sepulchre (Cirad) and José do Carmo A. Lopes (Embrapa).   These training sessions helped to identify some desirable modifications to the framework and user interface for application in Brazil.

4.1.3   Existing training materials were reviewed for adaptation in Brazil. A training course developed for application in Indonesia in conjunction with the Berau Forest Management Project of the European Union was suggested as a model (van Gardingen, 1999; van Gardingen, Phillips & Ridwan, 2001).

4.1.4   The most recent training materials developed for the SYMFOR project was presented to a workshop in Indonesia in 2001 and is available electronically http://www.symfor.org/Other_Reports/Workshop_Training.pdf and additional training material is available on the training site http://www.symfor.org/training. It was noted that the SYMFOR implementation for Brazil differs from that used in Indonesia and that the training materials will need to be customised for use in Brazil. The size of the task will also be influenced by the plans to translate the user interface into Portuguese.

Recommendation
13   Dendrogene project staff and partners should evaluate existing training materials available for SYMFOR to help define a specification of their needs to support the uptake process in Brazil *Dendrogene*   *June 2003*

5   Documentation

5.1.1   The consultant provided Dendrogene staff with a CD containing copies of all outputs from the SYMFOR project (in Indonesia, Guyana, Brazil) and a copy of the current version of the SYMFOR web site (http://www.symfor.org). It was agreed that a copy of the web site would be hosted on an Embrapa web site to provide more rapid access for local users.

Recommendation
14   Embrapa will create a mirror image of the current web site for SYMFOR as a first step towards providing a customised version for the Brazilian uptake process.
Embrapa   *April 2003*

5.1.2   Dendrogene staff were provided with access codes to the SYMFOR FTP site in Edinburgh to enable downloads of the full source code of the SYMFOR framework. This will be used to develop a local version in Portuguese

6 Terms of Reference

**Building local capacity for the application of the simulation model
SYMFOR to forest management in Brazil**

6.1 Background

This five year project, begun in January 2000, follows the Tropical Silviculture Research project which ran from 1993-1998. It also builds on the work of the DFID projects Flora of the Ducke Reserve and the Biomass and Nutrients Project, both implemented by INPA. DFID financial commitment is 1.6 million pounds. The project goal is the sustainable use and conservation of the genetic resources of the humid tropical forests in the Brazilian Amazon region. The project purpose is to develop mechanisms to apply scientific knowledge (botany, reproductive ecology and genetics) to promote the sustainable forest management. The premise is that much research has been conducted but through lack of integration and access in a useable form it has been of little value to forest managers. The project will assist the development of useable criteria and indicators for the genetic sustainability of forest management. The project will provide improvements in the short-term to ensure the long term sustainability of forest management and hence maintain the livelihoods of those dependent on this major resource of the region while conserving the base biological diversity and safeguarding the environmental benefits of the forest.

The project is being implemented by EMBRAPA Amazônia Oriental. The project has sought and received the support of many interested institutions through two planning workshops.

6.2 The project

The project outputs are:

- a database containing information on the botany, reproductive ecology and genetics of neotropical tree species.

- simulation studies (based on the model ECO-GENE) of the impact of different forest management treatments on genetic diversity

- capacity of forest management and research institutions to correctly identify tree species of economic importance developed

- knowledge of reproductive ecology and genetics incorporated in forest management support tools such as TREMA.

The Project has supported consultations within Brazil, French Guiana and Guyana on the potential applications of SYMFOR, a forest growth model developed with DFID support in Indonesia by the University of Edinburgh. It was concluded that SYMFOR offered stochastic, spatially sensitive forest growth modelling of interest for the development of Ecogene. Embrapa data were identified as the best source to parameterise and test the model. Training was given to an Embrapa researcher in SYMFOR model development and with consultancy support a SYMFOR model has been calibrated with the Embrapa data.

This consultancy will now promote the application of this model to forest management issues in Brazil through training and support to a locally appointed officer responsible for developing Brazilian capacity in model use.

6.3 Objectives of the consultancy work

1. Train the Brazilian Simulation model promotion officer in the application of SYMFOR

2. Develop a work plan for the officer with emphasis on promoting the utilisation of SYMFOR by key stakeholders

3. Assist in the preparation of suitable promotional and support documentation (manual and folders)

4. Review progress, make recommendations on modifications to the work plan as required and provide backstopping support

6.4 Outputs

1. Brazilian officer trained

2. Work plan developed.

3. Documentation defined

4. Report on progress with recommendations

6.5 Administrative details

Location: The consultancy will be carried out at Embrapa Amazonia Oriental, Belém, Brazil

Counterparts: Celso Azevedo, Embrapa Western Amazon and Dr Jorge Yared, Embrapa Amazonia Oriental

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