BOManejo: software for forest managers

An ITTO project has helped develop a computer tool to speed up and improve forest management planning

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Soft launch: Jose Francisco Pereira introduces the BOManejo software at a launch event in Belém, Brazil, in June 2018. BOManejo has been used successfully in a pilot trial by Cikel Brasil Verde Madeireiras Ltda, a large forest company. *Photo: R. Rosal*

In the Brazilian Amazon, operators are required by law to follow sustainable forest management plans (SFMPs) that have been approved by the appropriate governmental institutions. As part of SFMPs, operators must conduct a 100% forest inventory of the area to be logged in a given year; they must also have annual operational plans that specify the activities to be carried out and indicate the trees to be logged, with their geographic position, scientific name, diameter at breast height, height, and wood volume. Harvesting is permitted only after state and federal agencies have evaluated and approved the annual operating plan.

The forest inventories carried out to meet these legal requirements produce an enormous quantity of data, the analysis of which requires significant data-processing capacity. Most operators use electronic spreadsheets, making the process slow and cumbersome and not conducive to good forest management planning.

Brazil's forest sector needs—and demands—software that speeds up and improves the forest planning process by aiding the selection of harvest trees based on clear criteria, providing better control over timber production, and enabling sustainable forest management.
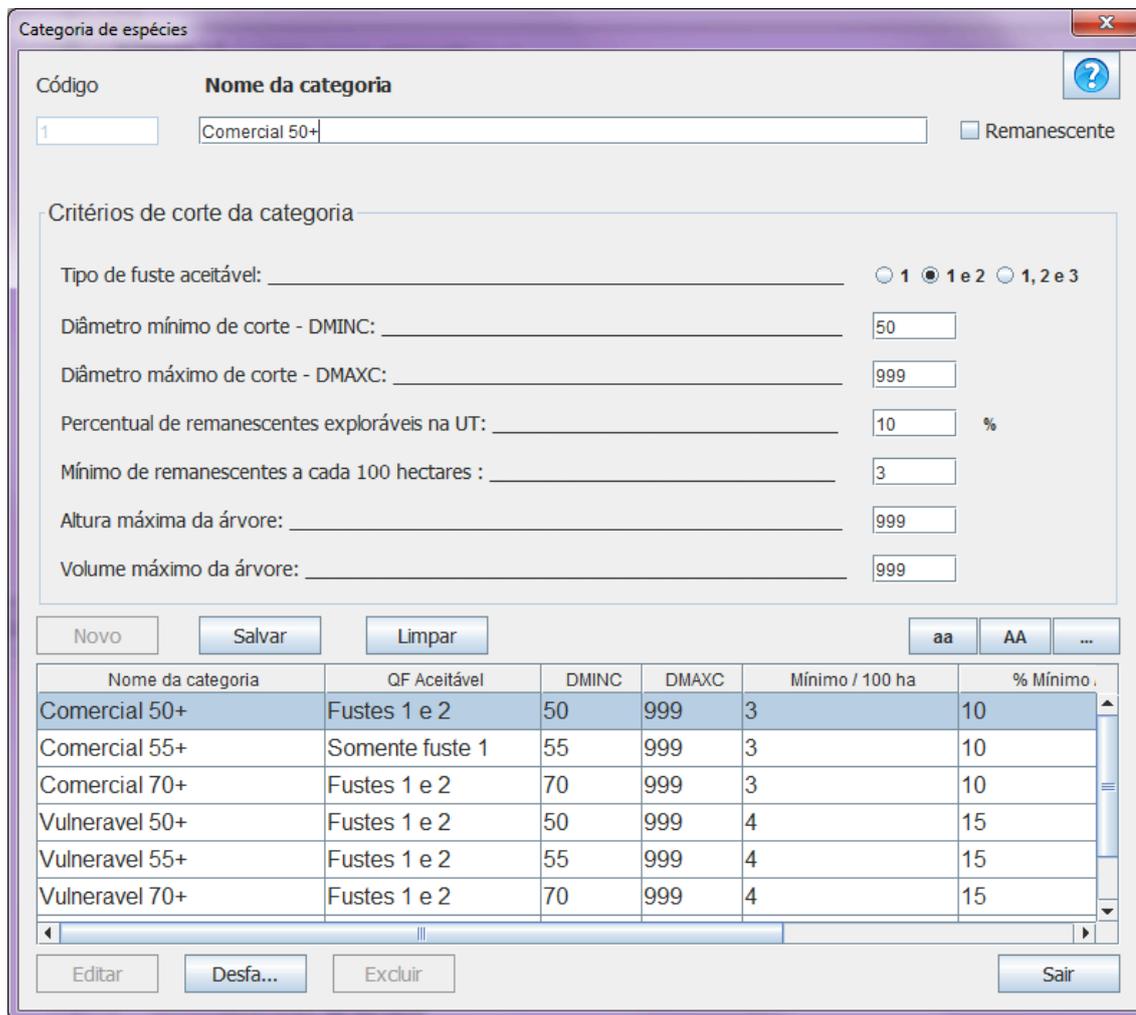
BOManejo

In 2008, as part of ITTO project PD 57/99 Rev.2 (F): "Sustainable management of production forests at a commercial scale in the Brazilian Amazon" (also known as the Bom Manejo project), Embrapa created forest-management-planning software known as Planejo. Issues with the user interface and data processing, however, limited the uptake of this tool.

Embrapa obtained the support of another ITTO project (PD 452/07 Rev.5 (F): "Sustainable management of production forests at the commercial scale in the Brazilian Amazon phase II") to improve the Planejo software, ultimately developing BOManejo. This new software has a significantly better interface and more powerful data-processing capacity than Planejo. Overall, BOManejo is better suited to meeting the data requirements of recent forestry legislation, and it also takes advantage of rapid advances in information technology. The software was developed in the Java programming language and uses PostgreSQL. The latter is an open-source relational database management system that efficiently organizes large quantities of data; provides a systematic, clear vision of the data; and offers easy access with a high level of security, control and assurance of information integrity.

The user-friendly, flexible interface (Figure 1) enables forest managers to refine and adjust the criteria for selecting trees for felling, using combinations of parameters such as bole quality, minimum cutting diameter and percentage of remaining individual trees per species; managers are also able to use the software to quantitatively and qualitatively evaluate the volumes to be harvested. Using information from the forest inventory, the identified selection criteria and parameters specified by law, BOManejo can interactively select the trees to be harvested.

Figure 1: A screenshot of a BOManejo page showing species categories and the criteria to be followed in the tree-selection process

BOManejo can be used to generate reports and spreadsheets for submission to the licensing governmental offices—the Brazilian Institute of Environment and Renewable Natural Resources (*Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis—* IBAMA) and relevant state agencies. These agencies review the documentation before approving an annual operational plan and issuing an authorization for forest logging (*autorização de exploração florestal—*the legal document that authorizes timber extraction).

The BOManejo software also enables the precise quantitative monitoring of tree felling, extraction and log transportation, increasing the capacity of managers to control production and avoid exceeding cutting limits (and therefore the risk of legal penalties). Such control is a legal requirement for receiving authorization to transport and sell the logs. Discussions are ongoing on the potential to directly integrate BOManejo into the state and federal electronic systems.

BOManejo launching event

In 2016 and 2017, the BOManejo software underwent a validation process with Cikel Brasil Verde Madeireiras Ltda, one of the biggest forest enterprises in the Amazon, which used the software to develop and submit its annual operating plan to the Pará State Secretariat of Environment and Sustainability (*Secretaria de Estado de Meio Ambiente e Sustentabilidade*). Over the period, Cikel managed about 19 000 hectares using the BOManejo software, showing the potential impact of this tool over significant forest areas in the Amazon.

BOManejo was launched in June 2018 in Belém, Pará, as a joint effort of Embrapa Amapá and ITTO project PD 452/07 Rev.5 (F). About 70 forestry technicians, researchers and representatives of governmental environmental agencies and timber entrepreneurs (both private companies and communities) attended the launch.

"Our experience of using this tool shows that the harvesting planning process is much faster with BOManejo because it makes all the harvesting

calculations," said Cikel forest engineer Josué Evandro Ferreira. "What used to take us an entire night to prepare, the system does in two hours. It is also very flexible because it allows changes to analyses according to the change in the criteria of tree and/or species selection."

Also at the event, Ms Margarida Ribeiro from the Arimun community, located inside the "Verde para Sempre" Extractive Reserve in Porto de Moz, spoke of the high expectations of her community for the Bom Manejo project. She talked of a wide range of important issues facing forest communities, for which they need support from research institutes, including computer tools like BOManejo.

Juan Vicente Guadalupe Gallardo, the coordinator of the ITTO-funded activity PP-A/47-266: "Building capacities for ACTO [Amazon Cooperation Treaty Organization] member countries in ecologically responsible forest management and biodiversity conservation in managed forests of the Amazon", stressed the importance of the BOManejo tool. He reported interest among neighbouring Amazonian countries in using BOManejo and other computer tools developed by the ITTO project. Indeed, the BOManejo user manual has already been translated into English and Spanish, and the software can be adapted to take into account relevant laws in any jurisdiction.

Next steps

In addition to continuous improvement of the software over time, two new modules are planned for BOManejo with additional functionalities. These are:

1) **Mapping module.** Few managers are proficient in the use of geoprocessing software, yet one of the requirements for obtaining a licence for an SFMP is the submission of maps based on a forest inventory showing, among other things, tree locations. During harvesting, field teams need operational maps indicating where they will find the trees to be logged and extracted from the forest. This module is in development as a plug-in for QGis, a free, open-source geographic information system, which will enable users to easily produce such operational maps.

2) **Licensing module.** The government's licensing offices in the states of Amapá, Mato Grosso and Pará have shown interest in this module, which they believe will help the efficient processing of authorizations for annual operational plans. Currently, government offices must recalculate all figures in the submitted annual operating plans, which is tedious work. BOManejo automates many of these calculations, enabling technicians to better address other important issues in the authorization process. The adoption of BOManejo by governmental offices will undoubtedly stimulate uptake by forest managers because it will speed up authorization.

BOManejo has considerable potential to be used for many SFMPs covering vast areas of the Amazon. We expect BOManejo to become a platform through which a wide range of new technologies and know-how will be made available to all forest stakeholders, enabling them to manage their forests more efficiently and sustainably, with considerable economic and environmental benefits.

Publications produced by the project can be found by inserting the project code PD PD452/07 Rev.5 (F) into the ITTO project search function at www.itto.int/project_search

BOManejo can be downloaded at: www.embrapa.br/bom-manejo