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Lessons learned from the implementation of VDTT and EMDS for the management planning of the Okanogan Wenatchee National Forest (WA, USA)

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Abstract

The development and use of decision support systems for forest management (FMDSS) have considerably increased worldwide in the last decades in accordance with the recognition of the multifunctional role of forests. The Vegetation Dynamics Development Tool (VDDT) and Ecosystem Management Decision Support (EMDS) system are used for forest planning purposes in the Pacific Northwest Region of the United States Forest Service (USFS). Lessons learned have been explored using case study methods. Important working knowledge derived from success or failure according to the users' perspective concern data availability for modeling, expertise needed to run the tool, the models' level of resolution, and communication between the modelers and the team involved in forest planning. Lessons learned coming from developers highlight the success of the DSS evaluating the models' characteristics, the tool's innovation and the integration of the best available science into the models.
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1. Introduction

Since at least the early 1980s, forest management has been a hotbed of decision support system development [1]: first-generation systems were typically designed to address singular problems (silvicultural, suitability of tree species for reforestation, disease problems, etc.).

In subsequent years, the need to address multiple demands for goods and services from forest ecosystems while not precluding opportunities for future generations [2], resulting in the birth of the sustainable forest management, led to the development of multifunctional systems with broader resource application. The needs of forest owners, public institutions, forest industry, and society at large to address the complex issue of sustainable forest management helped to foster this development [3], supported by the rapid progress in computing hardware and software systems engineering. The use of DSS in forest management may improve the decision making-process in all of its phases (intelligence, design, choice and implementation) and can support the choices that managers have to make considering the multitude of purposes of forests.

The European experience with developing and applying forest DSS seems to have reached a level of maturity such that the COST, one of the longest-running European frameworks supporting cooperation among scientists and researchers across Europe, funded for the period 2009-2013 an Action focused on FMDSS, named FORSYS. The main objective of FORSYS was to develop guidelines for the development, testing, evaluation and application of FMDSS in multifunctional forestry. The scientific literature on FMDSS has traditionally been more focused on conceptual and application development than the use of these systems. Consequently, as one contribution to the overall FORSYS objective, researchers compiled a number of case studies to identify and share lessons learned concerning the development and use of FMDSS in the European COST countries and also in countries outside Europe, like the United States [4].

A case study provides a systematic way of looking at events, collecting data, analyzing information, and reporting the results. In such a context, descriptive case studies were conducted concerning the use of the VDDT and EMDS systems for forest planning purposes in the Okanogan Wenatchee National Forest (OWNF), a forest managed by the USFS located in the state of Washington (Pacific Northwest Region of the USFS). Important observations have been identified during years of VDDT and EMDS system usage by managers, analysts and developers who have accumulated experience which was used to structure the case write-up and synthesize some powerful and sometimes painful lessons learned along the way.

A lesson learned is knowledge or understanding gained by experience, that must be applicable in that it identifies a specific design, process, or decision that reduces or eliminates the potential for failures and mishaps, or reinforces a positive result [5]. Lessons learned is one of the common techniques used to transfer and share knowledge [6], and for this reason this approach was chosen to collect generalizations, based on evaluated experiences, for the drafting of guidelines for the development, testing and evaluation as well as the application of FMDSS in multifunctional forestry.

The paper is organized as follows: in section 2 notes about the research plan, and study context are given; in the section 3 objectives, use, and lessons learned from the application of each systems in the OWNF plan are described; in section 4 the conclusions are presented.

2. Materials and methods

2.1. The research plan

The research activities carried out to achieve the purposes of the present study were organized by structuring the research plan according to the DSS case study method suggested by [7] (Fig. 1).

The first step was the case selection. FORSYS researchers were encouraged to document FMDSS applications that they had experience with or connections to. The second author (Gordon) worked with individuals involved in the use of VDDT for OWNF planning, and the third author (Reynolds) had some involvement with the application of EMDS to the forest.