

## Stand Development



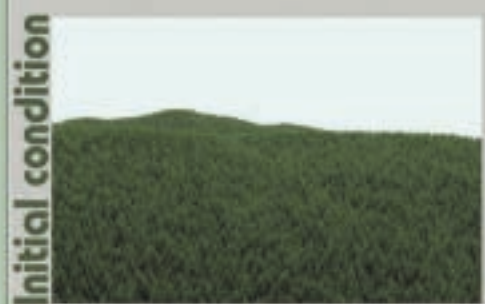
1 year  
after  
treatment



30 years  
after  
treatment



75 years  
after  
treatment



## Land Management Alternatives



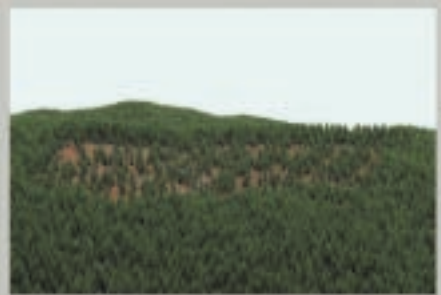
Uniform pattern



Small patches



Large patches



# EnVision

Environmental Visualization System



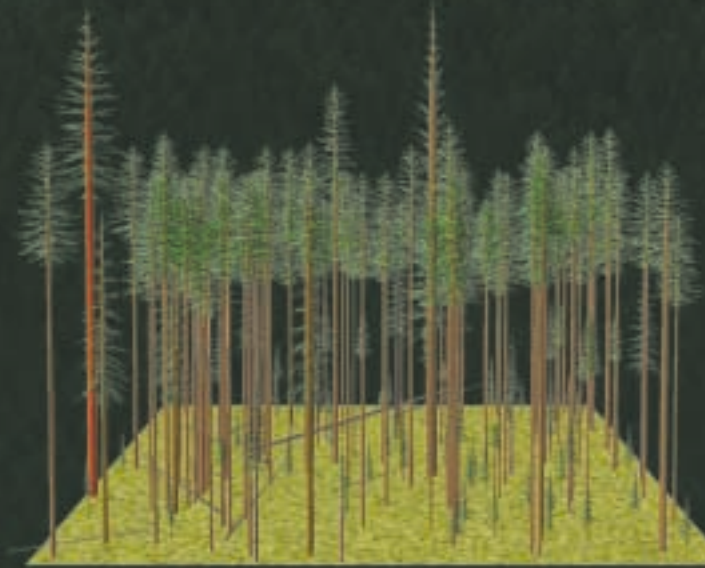
USDA  
Forest  
Service



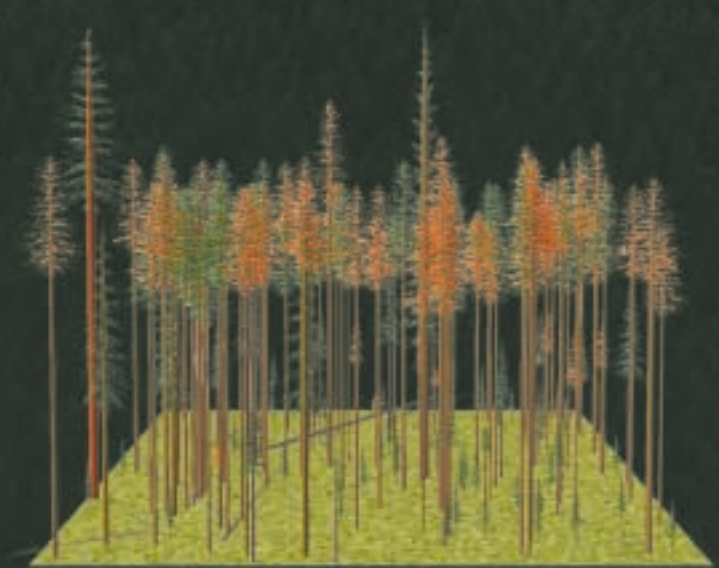
Pacific  
Northwest  
Research  
Station

## Visualize the Plan

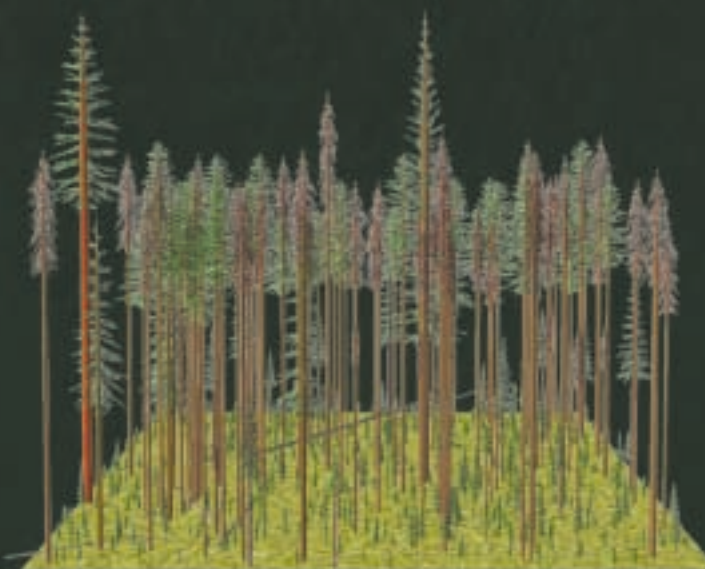
### Natural Disturbance



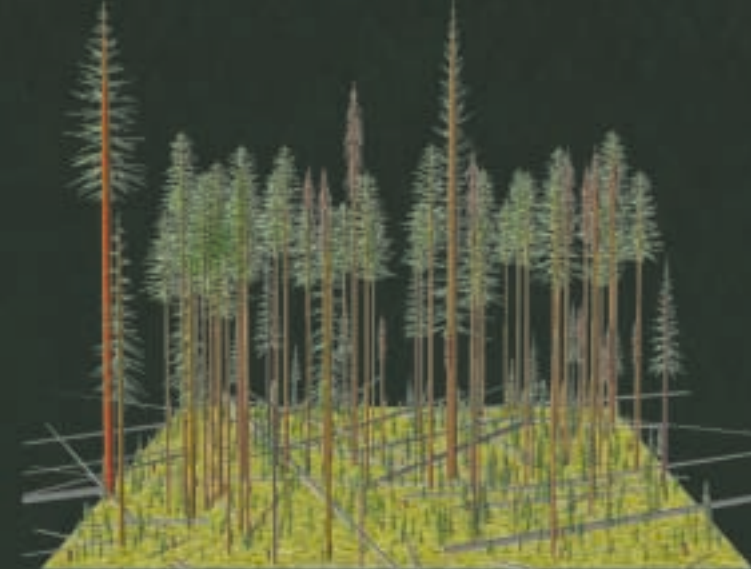
Healthy stand



Insect outbreak



High mortality



Dead trees fall down

EnVision

# EnVision

## Environmental Visualization System



Effects of a fire are simulated. This feature can illustrate the benefits of fuel and stand management activities.

Few people—even forestry professionals—can look at a data table describing the trees in a timber stand and visualize what it tells them. What if they could look at pictures, instead of numbers? It is even harder to visualize how that timber stand or landscape would look in the future if it were managed in different ways. Wouldn't it be nice if they could see how it might look in the future before they acted?

Computer-based landscape simulations have become a recognized tool for previewing the visual impacts of land use decisions. The simulations can:

- Help communicate stand and landscape conditions
- Show how stand and landscape conditions change with management activities, natural disturbances, and growth over time

### Goals

1. Be able to realistically visualize the effects of different management treatments over time
2. Improve forest planning and consideration of management options
3. Increase communication to the public and thereby increase public involvement

### Visualize and Communicate Changes and Choices

Developed by researchers at the Pacific Northwest Research Station, EnVision—the Environmental Visualization System—is one of the most sophisticated computer simulation tools available for illustrating stand- and landscape-scale projects.

Foresters, biologists, and others charged with selecting stands for treatment and designing silvicultural prescriptions often find it difficult to imagine the complex interactions that occur across landscapes. Traditional work methods have not always provided enough information to fully evaluate the cumulative impact of an array of management choices.

EnVision can help land managers and others to understand the effect of proposed treatment designs as well as help answer questions such as How well does the design meet the overall goals? How does the proposed design affect different resource values?

Forest managers of both public and private lands face a challenge when planning any kind of management activity: Will the public accept the way the landscape will look after proposed changes are made? How can they establish a dialogue about what the changes might look like on the landscape through time? EnVision shows particular promise for enhancing public communication.



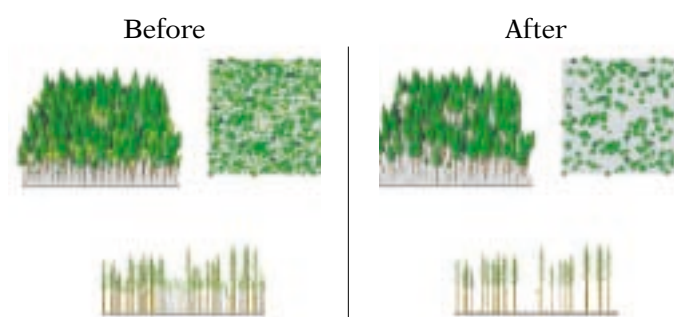
EnVision renders individual tree using a variety of methods.

### Applications

Perhaps the most powerful use of tools like EnVision has been to help break deadlocks in debates about forest management decisions. Managers have found visualization software to be an effective way to help community members see what would happen to landscapes under certain treatments, now and through time. The result is that more productive dialogue and the potential for greater consensus can come out of public meetings, by reducing the unknowns. Technical audiences benefit as well from visual images depicting stand and landscape conditions. Discussions regarding riparian conditions, habitat quality, and other more subjective forest characteristics are much more productive when visual representations of stand conditions and treatment effects are used to augment the more traditional quantitative data used to present and describe conditions.

### Silvicultural options at stand and landscape scales

Foresters charged with implementing silvicultural treatments to reduce fire risk, improve wildlife habitat, or produce higher value wood products find it difficult to design treatments that meet stand-level objectives while maintaining or enhancing the aesthetic qualities of a landscape. Visualization tools such as EnVision can provide feedback while designing a stand treatment, help communicate treatment effects to interested parties, and show the appearance of the treatment within its landscape context.



Stand visualizations show 1- hectare areas before and after treatment.



Landscape visualizations show stand characteristics within a landscape context.

### Stand development

EnVision depicts stand development over time using links to stand growth models such as the Forest Service's forest vegetation simulator (FVS) and landscape projection systems such as the landscape management system (LMS) developed at the University of Washington. Such linkages enhance the forester's ability to design treatments that better meet a variety of objectives both today and in the future. This ability to depict future conditions may help remind stakeholders of the

dynamic nature of forests and help them better understand how stands are affected by disturbances, both human caused and natural.

### Land Management Alternatives

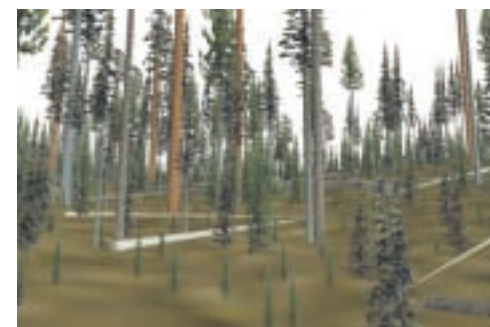
The appearance of forested landscapes and individual stands after a forest management activity is critical to public acceptance of these activities. Even with thorough planning, detailed site-specific analysis, and careful monitoring, many management activities will not be truly successful if the public views the resulting landscape as an eyesore. Computer visualizations provide one of the few objective representations that can be used to gauge public preference for various harvest practices. By using visualization tools, land management alternatives can be simulated within a landscape context that remains constant. Traditional preference rating approaches rely on photographs of treatments similar to those being evaluated... often from very different areas and depicting a variety of conditions outside the area of interest. Using such images can make it difficult to distinguish a viewer's preference for the treatment from their overall preference for the landscape in which the treatment is situated.

### Fuel Management and Prescribed Burning Effects

Much of the Western interior forests have undergone a shift in species composition and suffered extensive mortality due to insect and disease damage over the past 15 to 20 years. The resulting accumulation of dense understory vegetation and down fuels creates conditions that will result in high-intensity, catastrophic fires. Visualization can be used to help communicate this high fire risk and present options for reducing the amount of fuel present in these forests. Whether removed by mechanical methods or consumed during prescribed burns, reducing the amount of fuel present in these stands can greatly reduce the risk of severe fires and make it possible to control fires that do occur.



EnVision shows fire risk from accumulating understory vegetation and down fuels.



### Key attributes

EnVision is a full-featured image-generating system for stand- and landscape-scale projects. It builds on many of the concepts used to develop preceding visualization systems, such as vantage point, stand visualization system (SVS), and UVIEW. The EnVision program is based on a digital terrain model that defines the ground surface. Color and texture maps show ground surface characteristics and can create "synthetic aerial

photos" or highlight areas of interest, such as roads, streams, or observation points. The program uses individual tree lists and can expand stand tables into individual trees within polygons. Three-dimensional objects range from simple "sticks" to photo-realistic icons representing trees and other vegetation.

- EnVision scene definitions can include background imagery to depict distant landscape features; lighting control for time of day, month, or year; atmospheric effects such as clouds and fog; and foreground imagery.
- The program renders individual images by using either a still camera model and a specific viewpoint or multiframe animation sequences by using a movie camera model and a series of viewpoint locations.
- EnVision can work directly with existing forest inventory data.
- The minimum data required to use EnVision are a digital terrain model to represent the ground surface, a polygon overlay that delineates individual stands, and stand inventory data or SVS files to represent each stand on the landscape.
- Size of area is immaterial. EnVision can visualize a whole landscape or plots of less than 1 acre.
- It can show elements by using abstract or photo-realistic representations and offers several ways to render vegetation data.
- It can show the cumulative effects of management activities, natural disturbances, and growth over time.

### Caveats

- Photo-realism can depict forest scenes that look extremely realistic. Although this is an important advance in technology, it can be a drawback if it encourages viewers to believe they are seeing what the landscape will actually look like, down to the last tree. Viewers must be able to distinguish rendered images from photographs, and presenters need to determine thoughtfully the appropriate level of realism for each application. Otherwise, loss of credibility becomes a risk.
- EnVision was designed as a visualization tool, not a modeling tool. It cannot actually model or predict changes in conditions over time or resulting from management activities or natural disturbances. It is a viewing tool only that must look to modeling tools.
- The program draws from a lot of data from different origins, and users need to allow sufficient preparation time for processing and formatting data from inventory information to elevation data and features on the landscape.

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