Changes in Valley Vegetation in the Oregon Coast Range since Euro-American Settlement

Etsuko Nonaka[1], Patricia A. Benner[2], Thomas A. Spies[3]

[1]Department of Forest Science, Oregon State University, Corvallis, OR 97331, [2]Department of Fisheries and Wildlife, Oregon State University, Corvallis, OR, 97331, [3]USDA Forest Service Pacific Northwest Research Station, Corvallis, OR 97331

Abstract

In the Oregon Coast Range (OCR), **valley bottomlands** are unique ecosystems and were more or less covered with trees before Euro-American settlement. Valley systems have been altered extensively for agriculture and urban development, and case studies of two major valleys showed most of tree-covered area has been lost in the past 150 years. The two valleys had quite different historical vegetation cover types due to differences in climate and soil drainage, and it is not clear what vegetation cover has been lost across the entire Coast Range since settlement.

Introduction

Large valley bottomlands are one of the most altered landscape in North America. Productive floodplains covered with trees existed in North America before Euro-American settlement in valley bottomlands. In the OCR (Fig. 1), large valley bottomlands have largely been converted into agricultural fields and urban development. Valley bottomlands are relatively rare in the western United States, thus proportional loss of such systems has greater consequences than for other parts of the nation.

Valley bottomlands provide unique habitats that cannot be found in upland forests. Such unique habitats have been quasi-permanently lost from the landscapes, and their functions at landscape and regional scales have likely been impaired. Therefore, it is important to quantify what types of habitats have been lost from the region since the settlement in order to understand changes in habitat potential in the OCR.

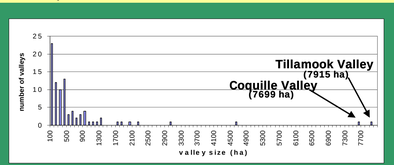


Figure 2: The distribution of valley size in the Oregon Coast Range.

Objectives

- Assess the pattern and distribution of valley bottomlands across OCR,
- Use remotely sensed imagery to describe and analyze current conditions of the two major valleys in the region: 1) Tillamook Valley and 2) Coquille Valley
- Compare and contrast the historical and current landscapes for the two valley bottoms.

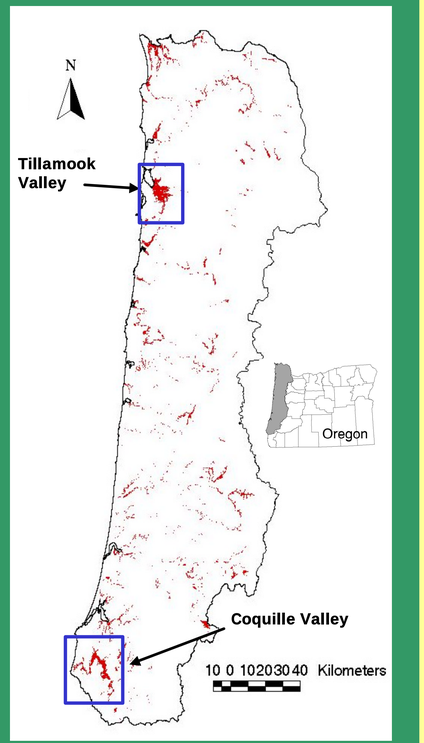


Figure 1: The valleys identified in the OCR in this study. The map shows the two largest valleys in the region that were further examined for the case studies.

The pictures show Coquille Valley. The current major landuse in the valley is primarily agriculture (hay for cattle) and development. The town of Coquille in located in the northeastern part of the valley. The aerial photographs of the area suggests very wet soil condition in some parts of agricultural fields.

Study areas

Tillamook and Coquille Valley (Fig. 1) were further examined as the case studies. Both valleys are located in Sitka spruce (*Picea sitchensis*) vegetation Zone (Franklin and Dyrness 1988) and have extensively wide valley bottom floodplain developed along the major rivers all draining into the Pacific Ocean. Hydrology of the rivers is affected by the ocean, and large estuaries are located at their mouths.

Tillamook Valley:

- Located in Tillamook County in the northwestern part of the OCR.
- Soil drainage varies from poorly drained to well drained, but majority of the valley bottom is well drained.

Coquille Valley:

- Located in Coos County in the southwestern part of the OCR.
- The soils are typical of floodplains and terraces. The floodplain soil is poorly drained, and the soils on the terraces are somewhat better drained.

Key findings

➢ **87 valleys were identified in the study area (Fig. 1) occupying about 2.8% of the OCR; 65% of the area of the valleys are currently non-forest type cover, and more than 95% is privately owned (Fig. 3). Non-industrial private category owns most of the valley.**

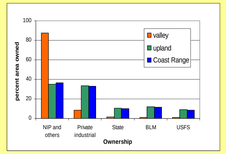


Figure 3: The allocation of ownership in the valleys, uplands, and the entire Oregon Coast Range

➢ **Historical vegetation between Tillamook and Coquille was quite different (Fig. 4):**

– Conifer trees were more common than hardwoods in Tillamook Valley. The most common species was spruce (Fig. 5), and there were many large spruce trees in the bottomland (Fig. 6).

– Hardwood trees were more common than conifers in Coquille Valley. The most common species was willow (Fig. 7). There were not as many large trees as in Tillamook (Fig. 8), but tree species richness was higher.

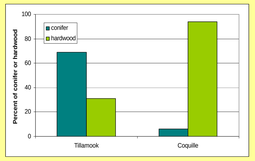


Figure 4: Percentage of conifer and hardwood trees recorded by the surveyors in Tillamook and Coquille Valleys.

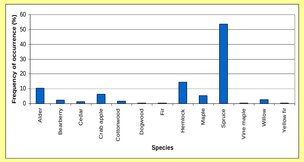


Figure 5: Frequency of occurrence for each tree species recorded in Tillamook Valley.

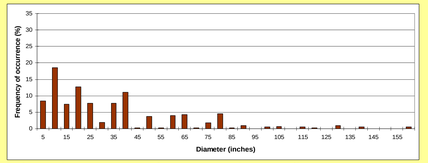


Figure 6: Frequency of occurrence by tree diameter recorded in Tillamook Valley.

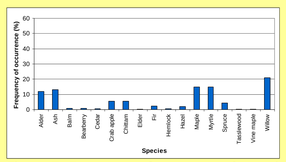


Figure 7: Frequency of occurrence for each tree species recorded in Coquille Valley.

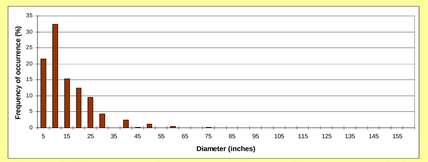


Figure 8: Frequency of occurrence by tree diameter recorded in Coquille Valley.

➢ **The difference appears to be caused by the difference in soil drainage:**

–The soils in Coquille Valley were mostly poorly drained, while those in Tillamook Valley were mostly relatively well drained.

➢ **Density of the trees were not high but quite variable in both valleys.**

– The distances from the survey corners recorded by the surveyors suggested that trees were patchily distributed over the landscapes of the Valleys.

➢ **Most of the tree covered areas in both valleys have been lost (Fig. 9, 10, 11, and 12), and most of the conversion was for agriculture.**

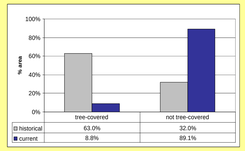


Figure 9: Comparison of historical and current vegetation cover for Tillamook Valley.

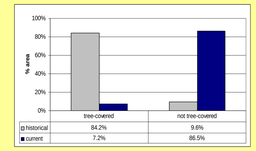


Figure 10: Comparison of historical and current vegetation cover for Coquille Valley.

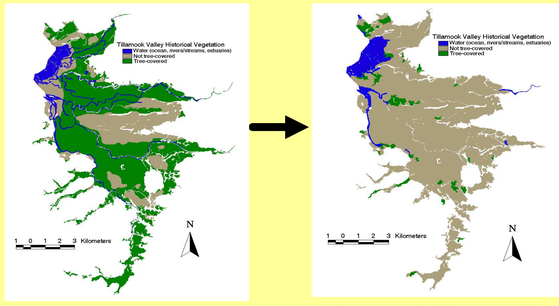


Figure 11: The historical and current vegetation cover maps for Tillamook Valley.

Early Settlement periods **Current (1995 or 1996)**

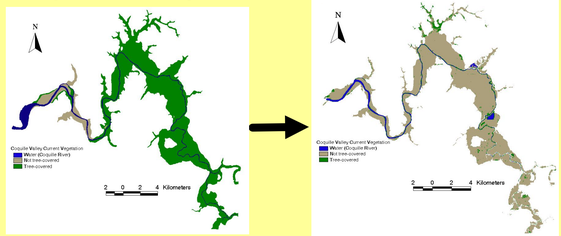


Figure 12: The historical and current vegetation cover maps for Coquille Valley.

Methods

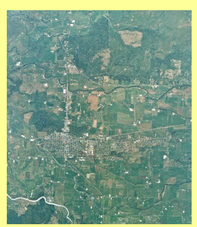
Assessing the pattern of valley bottomlands: The map showing major valley floors in the study area in a geographic information system (GIS). Valley floors were defined by elevation, slope, and proximity to $\geq$ 5th order river channels.

Historical vegetation pattern: The historical vegetation maps for the two valleys were adopted from previous studies. The General Land Office (GLO) Survey records and the Donation Land Claim settlement data from 1850s to 1870s provided information to reconstruct vegetation cover types.

Current vegetation pattern:The current vegetation maps for the two valleys were developed using remotely sensed imageries. The cover classes distinguished were: 1) water, 2) developed/bare ground, 3) agriculture/sparse vegetation, 4) deciduous tree dominated, 5) conifer tree dominated, and 6) mixed composition. The accuracy of the classifications was 88% for Coquille and 76% for Tillamook.

Vegetation change comparison: Because the classification schemes were different between the two periods and the two valleys, cover classes were combined into either tree-covered or non tree-covered type to compare area in each type between the two period and the two valleys.

The tree-covered category included any classes with some tree canopy cover (e.g. woodland to forest). I lumped the classes in this way because 1) the GLO surveyor recorded trees within reasonable distances, 2) structure provided by sparse trees have different functions as wildlife habitat than areas without trees, and 3) the ecosystem types are mostly missing on the current landscapes.



The aerial view of the center of Tillamook Valley. The downtown of Tillamook is seen near the middle of the photo. The current major landuse in the valley is primarily agriculture (hay for cattle) and development.

Conclusions

❖ **Valley bottomlands occupy a small proportion of the OCR but have disproportionally experienced impact of human activities since Euro-American settlement. The valleys are predominantly owned by private land owners.**

❖ **Because valleys are relatively rare in the OCR and environmentally unique, they make important contributions to the region's biological diversity by providing unique habitats.**

❖ **Based on the two case studies, valley bottomlands were once covered with more trees than at present, and most of tree-covered areas have been converted to agriculture. The case studies showed that historical vegetation in the two major valleys in the OCR was quite different from each other. Hardwoods were common in Coquille and conifers in Tillamook. Soil drainage appears to be the reason for the difference.**

Further research

❖ Examination of other valleys is needed to understand changes across the OCR. Especially, examination of soil drainage in the valleys may help understand vegetation types existed prior to settlement.

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For further information, contact Etsuko Nonaka at etsuko.nonaka@orst.edu