

Potential Economic Impact of Mt. Hood Lahars

An Exploratory GIS Research Project

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What is a Lahar?



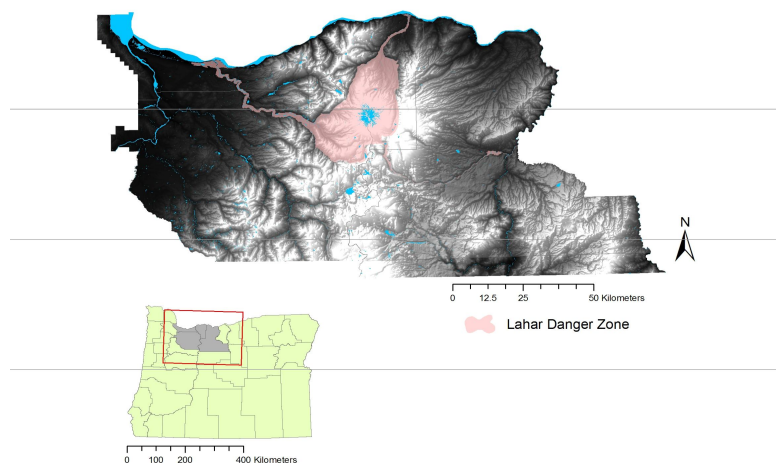
Mt St Helens

- Lahar: mudflow with pyroclastic material

Risk

- Most recent eruption of Lava Dome near Crater Rock: 1805
- 1-in-15 to 1-in-30 risk of similar eruption resulting in lahars in next 30 years
- Greatest risk: lahars sweeping down Sandy, Zigzag, and White River Valleys
- Smaller risk of more catastrophic eruption affection larger portion of Mt. Hood valley

Lahar Danger Zone



Background

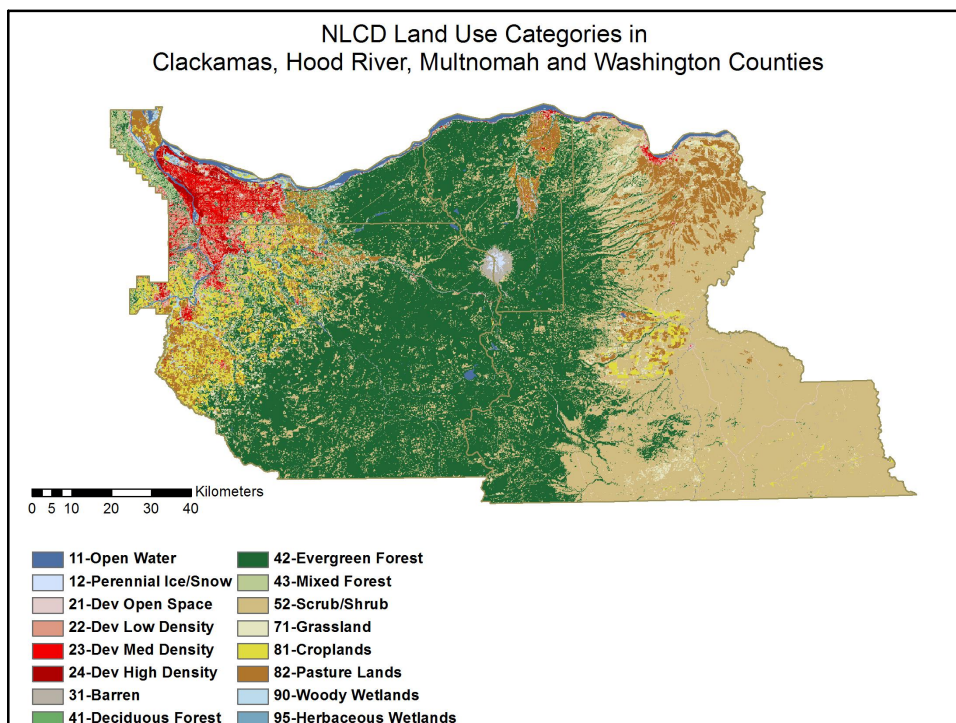
- USGS Used LAHARZ model to estimate area of inundation and times of travel
- Total area of highest risk scenario:
 - 938,727,476 sq meters

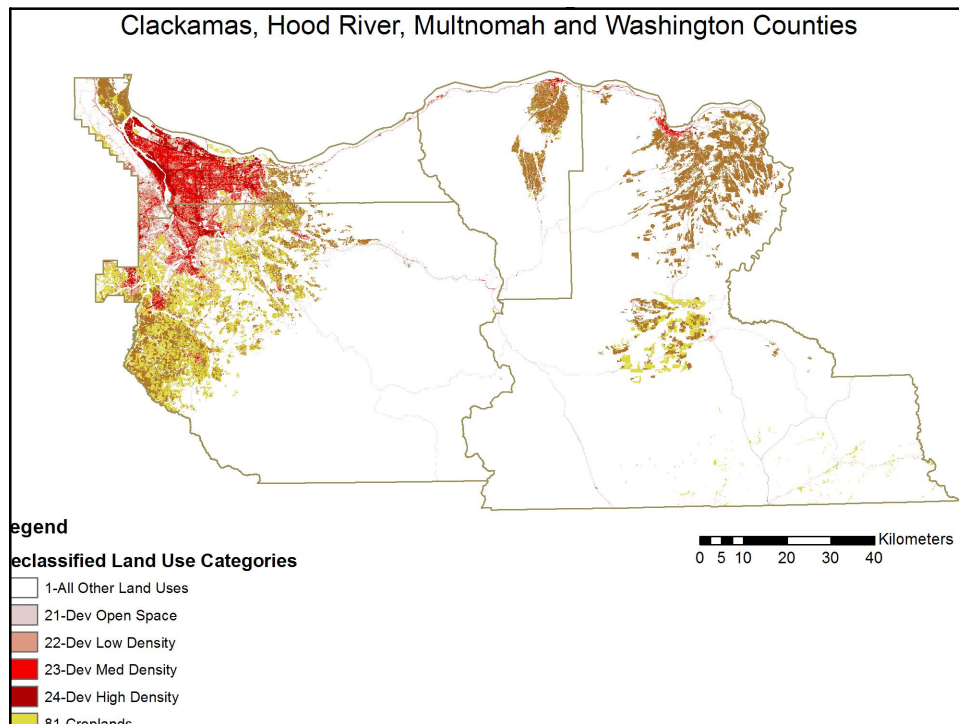
Data Sources

- **Timber Data: Mt Hood National Forest GIS**
 - Forest Boundary, Oregon Water bodies, Northwest Forest Plan, Riparian Reserve Areas, Wilderness
- **2006 USDA National Land Cover Dataset (30-m pixels)**
 - Land Use Categories used in analysis:
 - 31: Barren
 - 22, 23, 24: Low, Medium, High Density Populated Areas
 - 21: Open Developed Areas
 - 42: Evergreen Forest
 - 81, 82: Cropland/Pasture Land
- **State of Oregon Data:** Agriculture Report, Jobs Report
- **Census:** 2000 Census Blocks, 2006 Quickfacts

Evaluation

- Population
 - Jobs
 - Property Value
- Timber Revenue
- Agriculture Revenue
 - Livestock sales
 - Crop sales





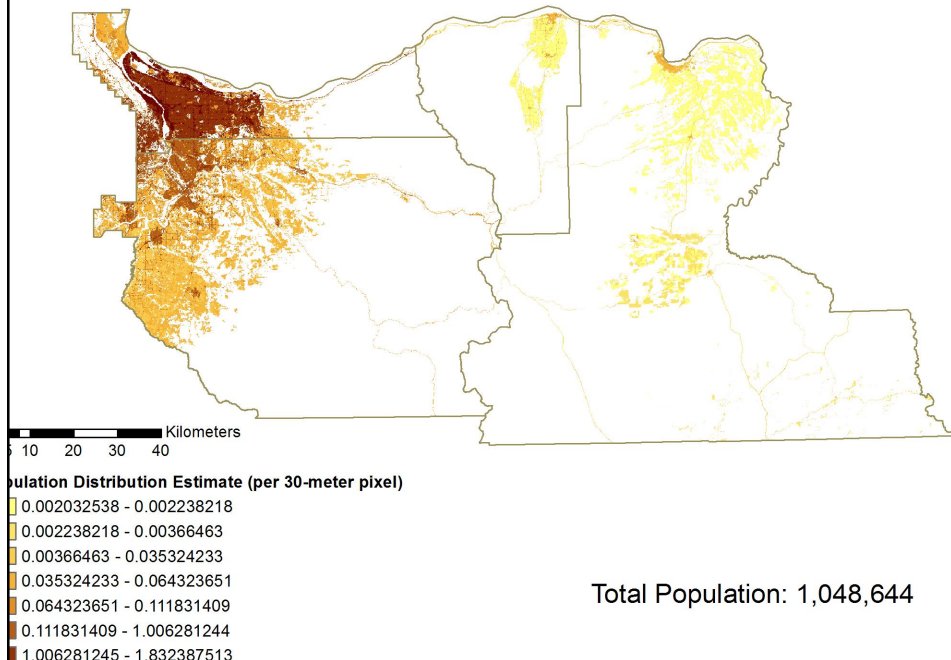
Population Distribution

- Dasymetric Distribution Estimate
 - 2000 Census Data
 - NLCD raster reclassified to constrain to 6 LU codes of interest
 - Density factors derived using continuous census blocks (only one land use type within the block)
 - Percent population calculated for each county: Clackamas (34.1%), Hood River (2.0%), Multnomah (69.1%), Wasco (2.2%)
 - Final density factors: density by land use type, by county

Population Density Factors

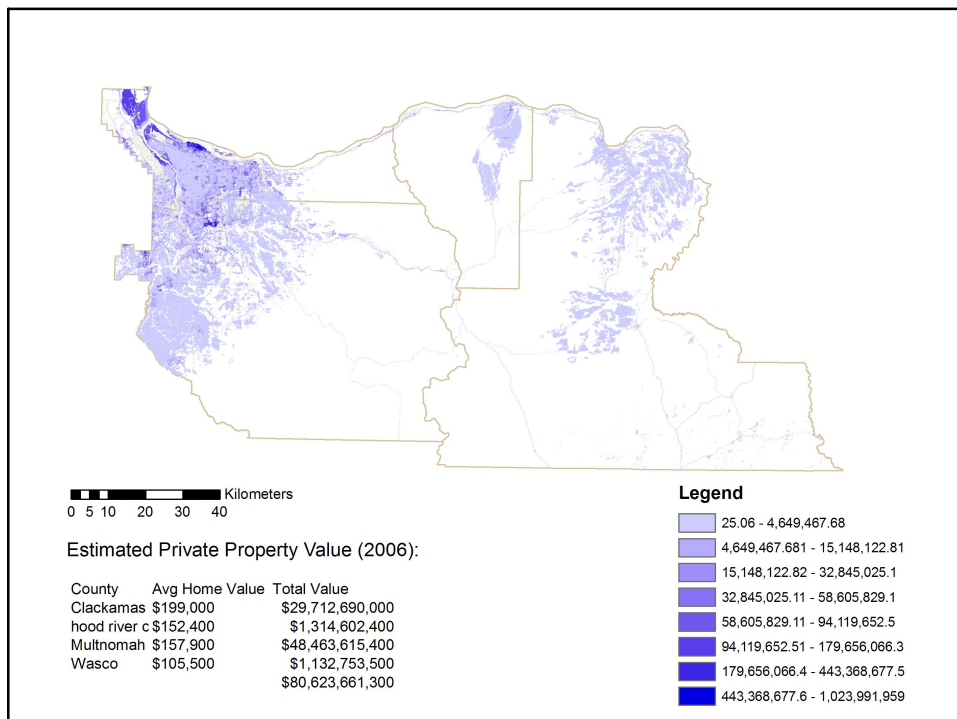
REL POP DENSITY	LAND USE CLASSIFICATION
1.55%	21. Developed, Open Space - Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes
21.81%	22. Developed, Low Intensity - Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover. These areas most commonly include single-family housing units.
26.95%	23. Developed, Medium Intensity - Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79 percent of the total cover. These areas most commonly include single-family housing units.
47.26%	24. Developed, High Intensity - Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to 100 percent of the total cover.
1.48%	81. Pasture/Hay - Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.
0.95%	82. Cultivated Crops - Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled.
100.00%	

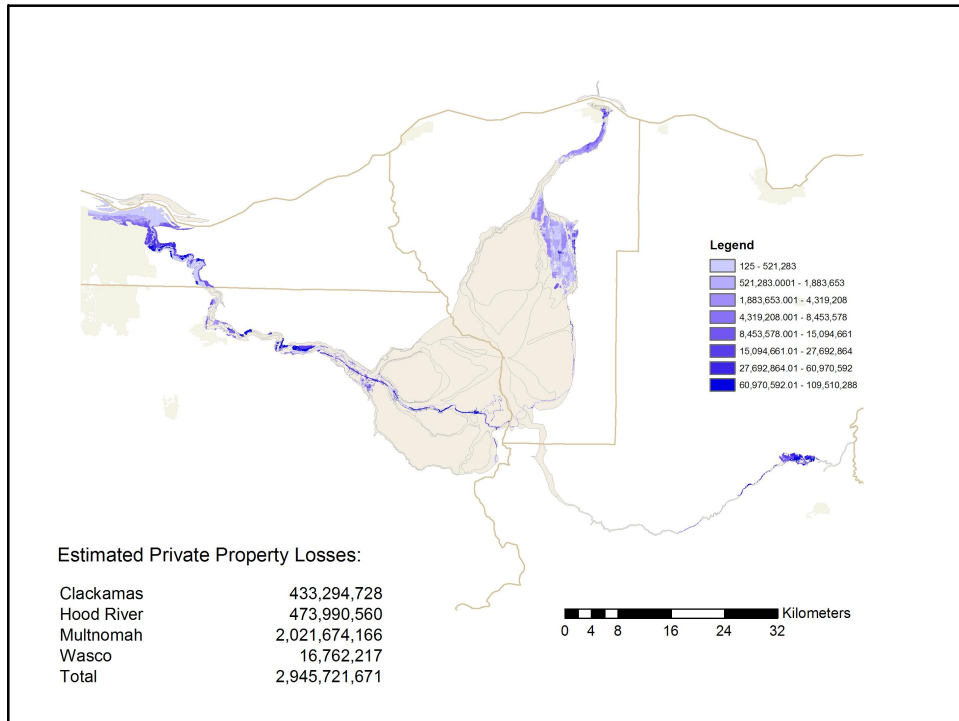
Clackamas, Hood River, Multnomah and Washington Counties



Estimated Home Values

- Census data – 2006 average home values for each county
- Total number of housing for each county
- Total county home value:
 - Average home value*number of housing units
- Home value by land use type by county:
 - Population density factor * Average home value

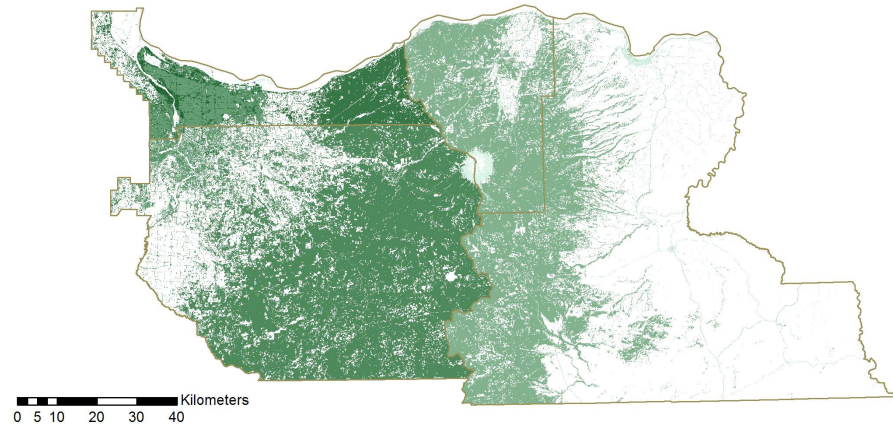




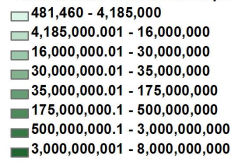
Jobs

- Numbers of jobs for each county by job type
- Matched job types to land use categories
- Used per capita income by county from 2000 Census

Job Value in Clackamas, Hood River, Multnomah and Washington Counties

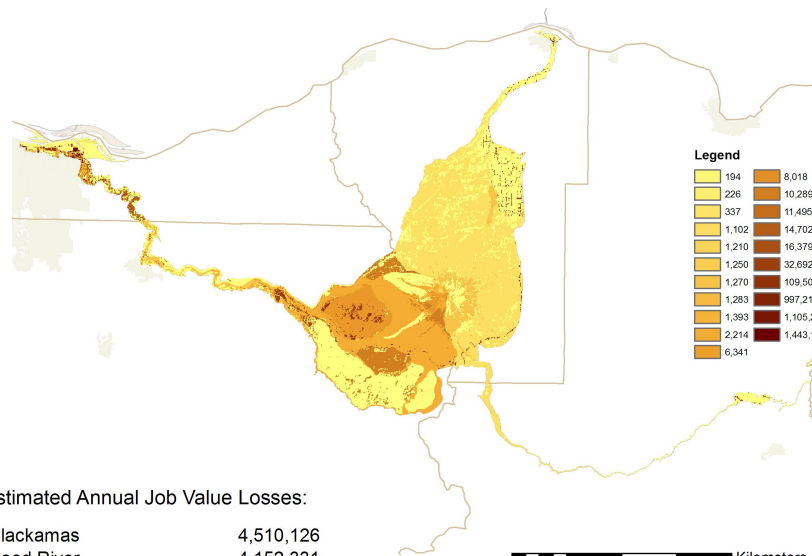


Value of Jobs in Mt Hood Eruption Risk Region

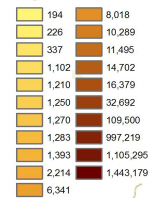


Job Value in Region:

Clackamas	\$3,732,813,587
Hood River	\$176,732,022
Multnomah	\$10,056,075,646
Wasco	\$156,422,915
Total	\$14,122,044,170



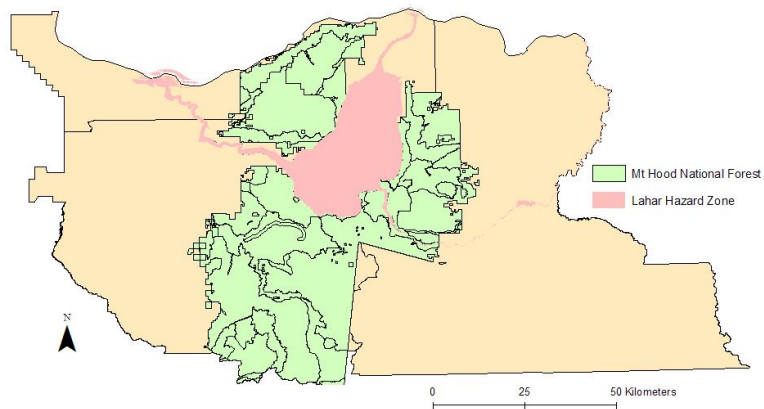
Legend



Estimated Annual Job Value Losses:

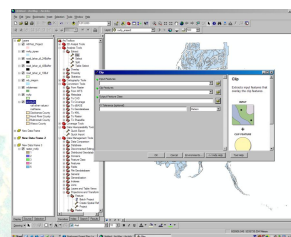
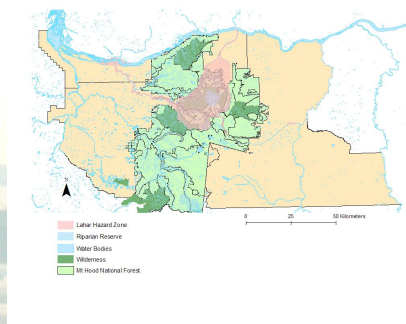
Clackamas	4,510,126
Hood River	4,152,331
Multnomah	3,818,093
Wasco	5,911
Total	12,486,461

Mt. Hood National Forest



Data Preparation - Clip

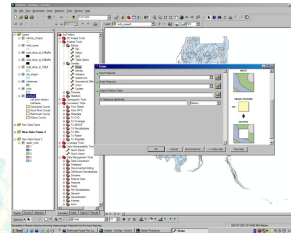
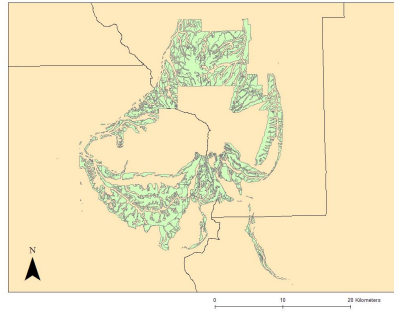
Features to be clipped by
Lahar Hazard Zone



- Mt Hood National Forest Boundary
- NFS Riparian Reserve
- Mt Hood Wilderness
- Oregon Waterbodies
- Roads

Data Preparation - Erase

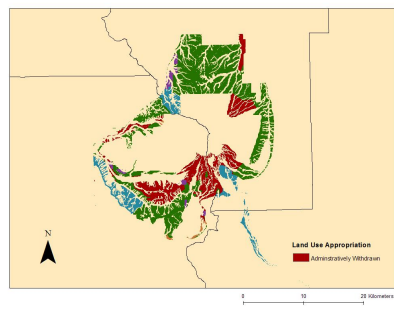
Features Erased within
Mt Hood National Forest
Lahar Risk Zone



- Mt Hood National Forest Boundary
- Roads
- NFS Riparian Reserve
- Mt Hood Wilderness
- Oregon Waterbodies
- 6500 Elevation (Timberline)

Data Preparation – Feature to Raster

Harvestable Timber: Mt Hood
National Forest Lahar Risk Zone



Rowid	VALUE*	COUNT	LUA	VALUES	TIMBERVAL
0	1	162836	OTHE	4.95	806038.2
1	2	31674	LISR	4.95	153816.3
2	3	60238	AW	0	0
3	4	5883		4.95	29120.85
4	5	1827	CR	4.95	9043.65

- Conservative Low value per CCF= \$0.55
- Average value per 30x30m pixel= \$4.95
- Timber Value= # pixels * \$4.95

- Administratively Withdrawn = No Timber Harvest

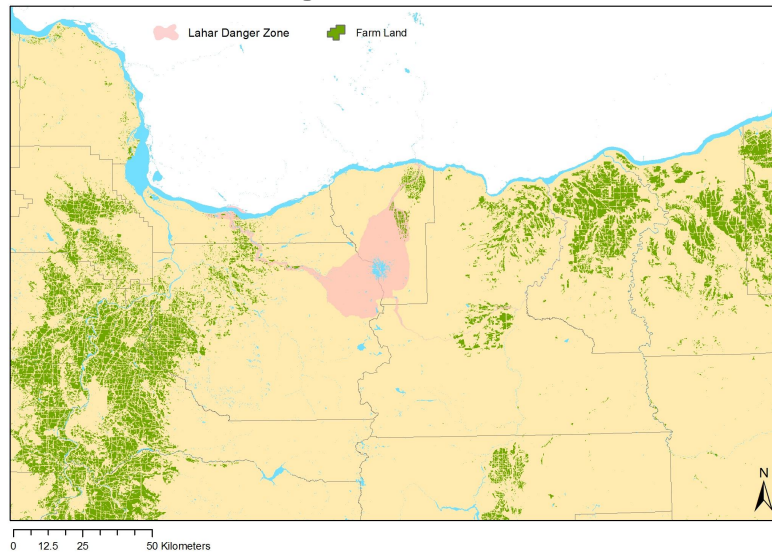
Timber

- Total estimated revenue value of all forest timber (assuming all is harvestable): \$2.24 million
- Total estimated revenue value of all currently harvestable forest timber: \$998,019.00

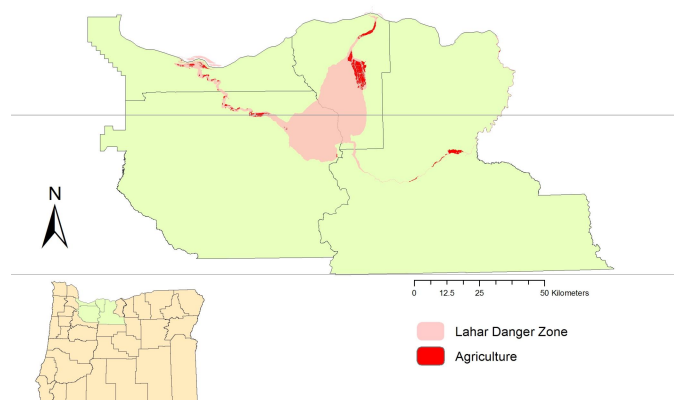
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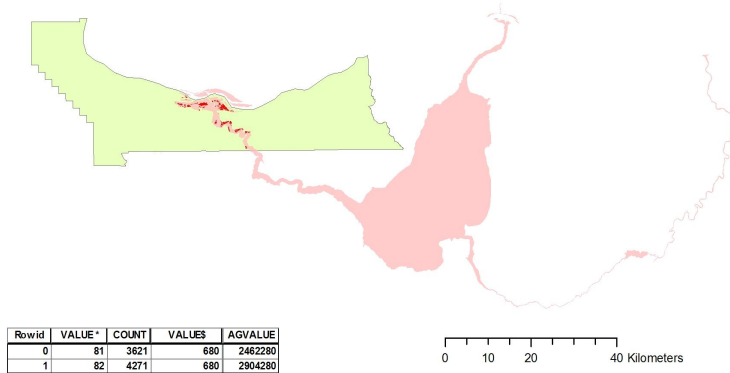
Agriculture



Potential Farm Loss

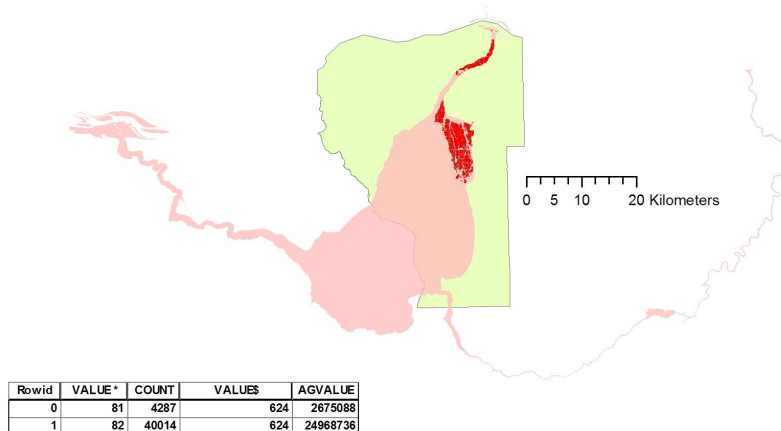


Multnomah County



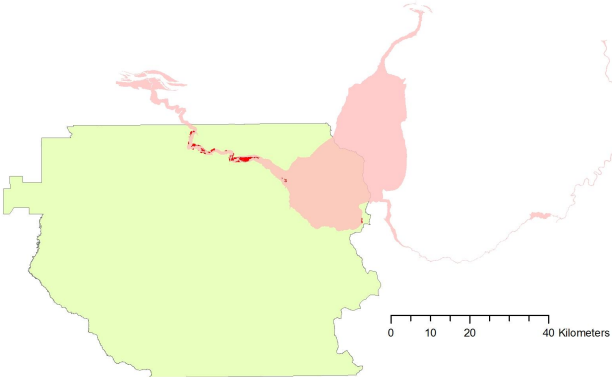
Total Loss of Farm Land in Dollars: \$5,366,560

Hood River County



Total Loss of Farm Land in Dollars: \$27,643,824

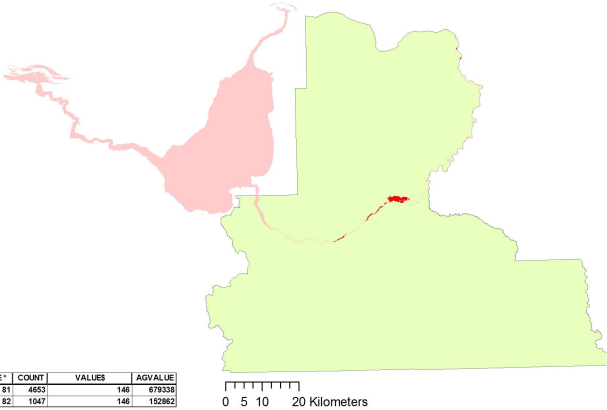
Clackamas County



RowId	VALUE*	COUNT	VALUES	AGVALUE
0	81	1149	556	638844
1	82	7878	556	4380168

Total Loss of Farm Land in Dollars: \$5,019,012

Wasco County



RowId	VALUE*	COUNT	VALUES	AGVALUE
0	81	4653	146	679338
1	82	1047	146	152882

Total Loss of Farm Land in Dollars: \$832,200

Agriculture

- Total estimated loss of farm land for Multnomah, Hood River, Clackamas, and Wasco Counties: \$38,861,596



Results

County	Property	Jobs	Agriculture	Timber	Total
Clackamas	\$433,294,728	\$4,510,126	\$5,019,012		\$442,823,866
Hood River	\$473,990,560	\$4,152,331	\$27,643,824		\$505,786,715
Multnomah	\$2,021,674,166	\$3,818,093	\$5,366,560		\$2,030,858,819
Wasco	\$16,762,217	\$5,911	\$832,200		\$17,600,328
Total	\$2,945,721,671	\$12,486,461	\$38,861,596	998,019	\$2,998,067,747

- Total value demonstrates the impact of a volcano eruption on human lives in Oregon.
- Need of volcano monitoring and disaster preparation.

Limitations

- Many more economic sectors to evaluate.
- Broad-brush, exploratory analysis.
- More eruption scenarios to evaluate.

Sources

- Schilling, SP et al. USGS Open-File Report 2007-1222 , v 1.0. Digital Data for Volcano Hazards of the Mount Hood Region, Oregon: Data to accompany U.S. Geological Survey Open-File Report 97-89. 2008