

Appendix C:

Community Profile

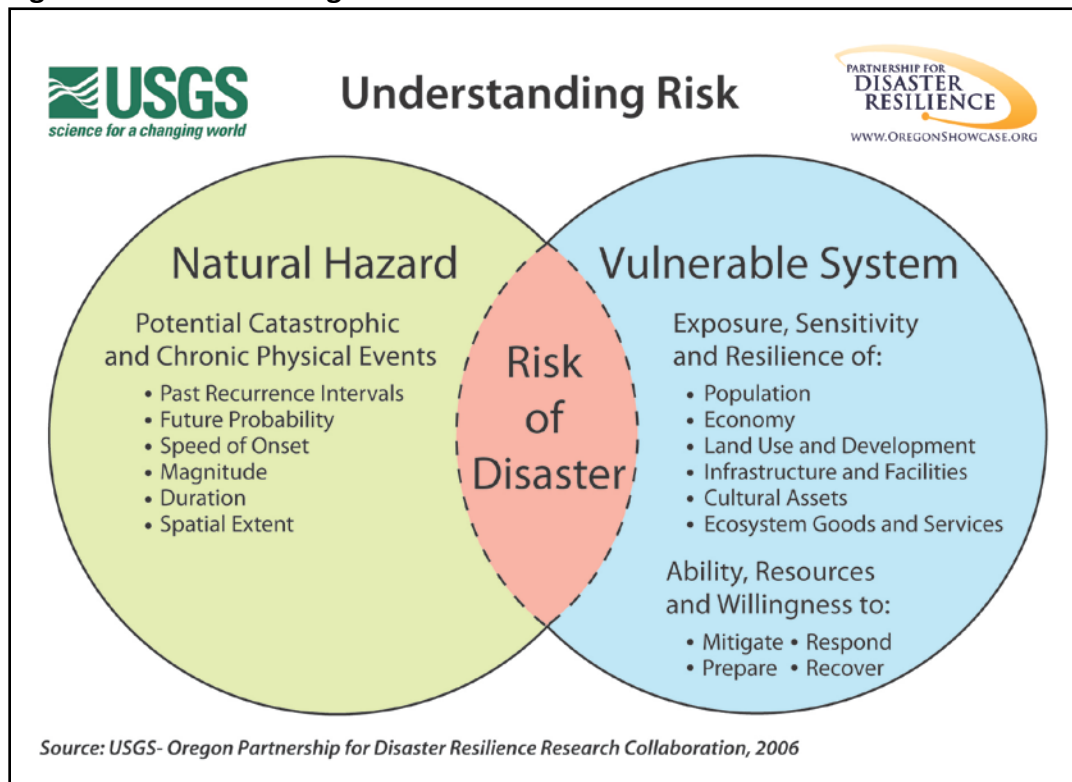
The following section describes the county from a number of perspectives in order to help define and understand the county's sensitivity and resilience to natural hazards. Sensitivity and resilience indicators are identified through the examination of community capitals which include natural environment, socio-demographic capacity, regional economy, physical infrastructure, community connectivity, and political capital. These community capitals can be defined as resources or assets that represent all aspects of community life. When paired together, community capitals can influence the decision making process to ensure that the needs of the community are being met.¹

Sensitivity factors can be defined as those community assets and characteristics that may be impacted by natural hazards, (e.g., special populations, economic factors, and historic and cultural resources). Community resilience factors can be defined as the community's ability to manage risk and adapt to hazard event impacts (e.g., governmental structure, agency missions and directives, and plans, policies, and programs).

The information in this section represents a snapshot in time of the current sensitivity and resilience factors in the county when the plan was developed. The information documented below, along with the hazard assessments located in *Section 3: All-Hazard Risk Assessment*, should be used as the local level rationale for the risk reduction action items identified in *Appendix B*. The identification of actions that reduce the county's sensitivity and increase its resilience assist in reducing overall risk, or the area of overlap in Figure 2.1 below.

¹ Mary Emery and others, "Using Community Capitals to Develop Assets for Positive Community Change," *CD Practice* 13 (2006): 2

Figure 2.1 Understanding Risk



Source: Clackamas County

Why Plan for Natural Hazards in Clackamas County?

Natural hazards impact citizens, property, the environment, and the economy of Clackamas County. Flooding, landslides, windstorms, severe winter storms, volcanoes, and earthquakes have exposed Clackamas County residents and businesses to the financial and emotional costs for recovering after natural disasters. The risk associated with natural hazards increases as more people move to areas affected by natural hazards. The inevitability of natural hazards, and the growing population and activity within the county create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce risk and prevent loss from future natural hazard s events. Identifying risks posed by natural hazards, and developing strategies to reduce the impact of a hazard event can assist in protecting life and property of citizens and communities. Local residents and businesses should work together with the county to keep the natural hazards mitigation plan updated. The natural hazards mitigation plan addresses the potential impacts of hazard events and allows the county to apply for certain funding from FEMA for pre and post disaster mitigation projects, that would otherwise not be available if the county did not have a Natural Hazards Mitigation Plan.

Natural Environment Capacity

Geography

Clackamas County has an area of 1,879 square miles and is located along the Willamette River in Northwestern Oregon. About one-eighth of the land area in Clackamas County is incorporated, while a majority is unincorporated. More than three-fourths of the county's area lies within the lower Willamette River basin. The Clackamas, Molalla, Pudding, and Tualatin rivers are major tributaries which flow into the Willamette. The remaining one-fourth of the county is within the Sandy River basin, a tributary of the Columbia River.²

Elevations in the county range from a high of 11,235-feet at the peak of Mount Hood (the highest point in the state) to a low of 55-feet in Oregon City located along the shores of the Willamette River. There are a variety of complex eco-regions, including high-altitude forests, foothills, lowlands and valleys, prairie terraces, and riparian forest. Clackamas County has two major physiographic regions that should be considered in planning for natural hazards: the Willamette River Valley, and the Cascade Range Mountains. The Willamette Valley, in western Clackamas County, is the most heavily populated portion and is characterized by flat or gently hilly topography. The Cascade Range, in eastern and southern Clackamas County has a relatively small population and is characterized by heavily forested slopes.³

Clackamas County has a long growing season and mild temperatures, which lead to a wide range of agricultural activities. Seasonal flooding, high ground water levels, and soil erosion cause most of the non-urban drainage problems in the county. When maintained in their natural state, Clackamas County's wetlands control runoff and decrease soil erosion and water pollution while reducing potential damage from flooding and helping to recharge water supplies.

Cascade Mountains

As Oregon's tallest peak, Mount Hood borders the eastern edge of Clackamas County and rises to 11,235 feet. Nearby volcanic neighbors along the Cascade Range include Mount St. Helens, Mount Adams, and Mount Jefferson. Mount Hood has had at least four major eruptive periods in the past 15,000 years, with the most recent one taking place around 1805, shortly before the arrivals of Lewis and Clark. These eruptions produced deposits that were primarily distributed along the Sandy and Zigzag rivers in Clackamas County. As one of the major volcanoes in the Cascade Range, it contributes to valuable water, scenic, and recreational resources which help to sustain agricultural and tourist segments throughout the region. When Mount Hood erupts again, volcanic ash is expected to fall and severely affect areas on its flanks as well as downstream in the major river valleys that lie in the path of the volcano.⁴

² Clackamas County Website: http://www.co.clackamas.or.us/co_dev/cityrev.html.

³ All Hazard Mitigation Plan Clackamas County, Oregon. G&E Engineering Systems Report 32.07.01, Revision.

September 23, 1988.

⁴ U.S. Geological Survey, The Cascade Range, "*Description: Mount Hood Volcano*". Accessed 19 December 2011.

http://vulcan.wr.usgs.gov/Volcanoes/Hood/description_hood.html.

Willamette River

The Willamette River Basin covers 11,500 square miles, encompassing 16,000 miles of streams and is ranked 12th among US rivers in volume.⁵ The river is about 187 miles long and is unique because it flows from the south to the north, originating in the mountains of west central Oregon, passing through Oregon City and over Willamette Falls, passing through the City of Portland and then emptying out into the Columbia River.⁶ The Willamette River is a vital, multi-purpose waterway that touches the lives of millions of people along its banks throughout the Pacific Northwest. The Willamette River has generated economic growth and promoted quality of life for the past 150 years. It is a source of power, irrigation, forestry, agriculture, and recreation. However, to achieve these benefits, the structure and integrity of the river have been compromised with increased population growth and development.

Clackamas River

Located west of the Cascade Range, the Clackamas River flows through a steep-walled canyon lined with dense forest and basalt crags as it heads towards its confluence with the Willamette River near Gladstone and Oregon City.⁷ This river was added to the Federal Wild and Scenic River System in 1988, and qualifies as “outstandingly remarkable” in five different resource categories—recreation, fish, wildlife, historic, and vegetation.⁸

The Clackamas River Basin is largely forested but has large areas of pasture used for grazing. More than 400,000 people depend on the Clackamas River for their drinking water. Parts of three streams/rivers within the watershed are listed as “water-quality limited” on the state’s 303(d) list, mostly for high water temperatures in the summer. These include the: lower Clackamas River (river mouth to River Mill Dam), Fish Creek (mouth to headwaters), and Eagle Creek (mouth to wilderness boundary). Occurrences of taste and odor problems in drinking water from the river have increased in recent years, apparently due to blue-green algae blooms. Upon request of a local consortium of drinking water providers, a proposal was developed to examine nutrient, algae, and water quality conditions basin wide.⁹

The Clackamas River and its tributaries provide numerous spawning and rearing areas for steelhead, as well as Coho and Chinook salmon. However, the Endangered Species Act listed the river’s steelhead as “threatened” on March 13th, 1998. The watershed is home to two wilderness areas: the Salmon-Huckleberry Wilderness and the Bull of the Woods

⁵ Portland Bureau of Environmental Services. “Willamette Watershed.” Accessed 19 December 2011. <http://www.portlandonline.com/bes/index.cfm?a=231466&c=30938>.

⁶ Willamette River Water Coalition. “About the Willamette River.” Accessed 19 December 2011. <http://www.willametteriver.org/willamette.php>.

⁷ Oregon Rivers. Accessed 19 December 2011. http://www.oregon.com/oregon_rivers.

⁸ Ibid.

⁹ U.S. Geological Survey, Oregon Water Science Center, “Clackamas River Basin Water Quality Assessment”.

Accessed 1 December 2011. <http://or.water.usgs.gov/clackamas/or176.html>.

Wilderness. More than 72 percent of land in the watershed is publicly owned, predominantly by the U.S. Forest Service.¹⁰

Sandy River

The Sandy River originates high on the slopes of Mount Hood, located about 50 miles east of Portland. The headwaters are beneath Reid and Sandy Glaciers at 6,000 feet in elevation. From there the river flows due west through the Hoodland Corridor. It cascades past the communities of Welches, Brightwood, and Sandy, then turns north to enter the Columbia River near Troutdale, which is 10 miles east of Portland, Oregon. Two separate sections of the Sandy River have been designated Federal Wild and Scenic Waterways. Riverside trails offer spectacular scenery, easily observed geologic features, unique plant communities, and other wilderness experiences. Just outside Portland, the lower Sandy flows through a deep, winding, forested gorge known for its anadromous fish runs, botanical diversity, recreational boating, and beautiful parks.¹¹

Climate

Temperature

Situated in the northern portion of the Willamette Valley, Clackamas County experiences a relatively mild climate with cool, wet winters and warm, dry summers.¹² As Table 2.1 shows, temperatures in Oregon City, located in the Valley, rarely exceed 90°F in the summer or drop below 30°F in the winter. Average temperatures in the summer range from the low 80s down to the low 50s, while average temperatures in the winter range from the mid 40s to the low 30s. Because of these mild temperatures, the average growing season in Clackamas County generally lasts for 150-180 days in the lower valley and for 110-130 days in the foothills (i.e. roughly above 800–feet in elevation).¹³

¹⁰ Ibid.

¹¹ Oregon Rivers. Accessed 19 December 2011. http://www.oregon.com/oregon_rivers.

¹² Loy, W. G., ed. 2001. *Atlas of Oregon*, 2nd Edition. Eugene, OR: University of Oregon Press.

¹³ Ibid.

Table 2.1: Monthly and Annual Average Temperatures (deg F), Oregon City, 1971-2000

Month	Mean max	Mean min	Mean temp	Extreme max	Extreme min
January	47.9	35.7	41.8	66	12
February	52.8	37.3	45.10	75	10
March	58	39.70	48.9	81	22
April	63.4	42.6	53	92	28
May	70	47.60	58.80	104	33
June	75.8	52.10	64	102	37
July	82.6	56	69.3	104	41
August	83	56.1	69.6	107	42
September	77.7	52.10	64.90	105	34
October	65.9	45.6	55.8	96	24
November	53.4	40.2	46.80	73	15
December	47	35.9	41.50	68	6
Annual	64.8	45.1	55	107	6

Source: The Oregon Climate Service, "Climate of Clackamas County."
http://ocs.oregonstate.edu/county_climate/Clackamas_files/Clackamas.html#table3

Precipitation and Snowfall

The most important determinant of precipitation is elevation. Because Clackamas County widely spans from the valley floor of Oregon City at 55 feet to the top of Mount Hood at 11,235 feet, it is no surprise that there is considerable variation of precipitation totals in the form of rain and snow, throughout the county. Below, Table 2.2 displays the monthly and annual averages of precipitation throughout weather stations across the county. The table shows that North Willamette Experiment Station, located near Canby, receives the lowest annual average precipitation rate at 42.6 inches and Government Camp has the highest annual average precipitation rate of 88.72 inches.

Table 2.2: Precipitation, Monthly and Annual Averages, 1971-2000

Month	Estacada 2 SE	Government Camp	Headworks Ptdl Wtr Br	N Willamette Exp Stn.	Oregon City	Scotts Mills 8 SE	Three Lynx
January	8.04	12.86	10.42	5.94	6.59	11.64	10.47
February	6.95	10.23	9.00	5.07	5.51	9.87	8.85
March	6.18	8.50	8.19	4.28	4.70	9.03	7.58
April	5.08	7.54	7.04	3.14	3.46	6.85	5.94
May	4.04	5.20	5.60	2.50	2.70	5.41	4.36
June	2.68	3.80	4.07	1.75	1.83	3.55	3.01
July	1.07	1.36	1.57	0.73	0.83	1.38	1.01
August	1.28	1.61	1.86	0.83	1.00	1.54	1.08
September	2.47	3.60	3.90	1.77	1.93	3.35	2.82
October	4.77	6.51	6.23	3.36	3.48	6.19	5.29
November	8.45	13.13	10.90	6.48	6.79	12.23	11.03
December	8.47	14.38	11.30	6.75	7.23	12.47	11.27
Annual	59.48	88.72	80.08	42.60	46.05	83.51	72.71

Source: The Oregon Climate Service, "Climate of Clackamas County."
http://ocs.oregonstate.edu/county_climate/Clackamas_files/Clackamas.html#table1

Table 2.3 displays the monthly and annual averages of snowfall which clearly shows that while the Valley floor experiences a mild winter with an average of 5-10 inches of snow per year, the areas surrounding the foothills of Mount Hood, such as Government Camp, are covered with snow for a majority of the winter months.¹⁴ Figure 2.1 is a map identifying the location of each weather station.

Table 2.3: Snowfall, Monthly and Annual Averages, 1971-2000

Month	Estacada 2 SE	Government Camp	Headworks Ptld Wtr Br	N Willamette Exp Stn.	Oregon City	Scotts Mills 8 SE	Three Lynx
January	0.8	53.9	3	0.5	0.6	13.7	5.7
February	0.9	41.5	2	0.3	0.8	14.3	3.1
March	0.1	36.7	0.7	0	0	12.6	0.9
April	0	25.6	0.2	0	0	5.8	0.4
May	0	7.6	0	0	0	0.5	0
June	0	0.6	0	0	0	0	0
July	0	0	0	0	0	0	0
August	0	0	0	0	0	0	0
September	0	0.3	0	0	0	0	0
October	0	5.3	0	0	0	0.4	0
November	0.3	36	1.4	0.1	0.1	6.3	2.3
December	0.6	45.6	1.6	0.6	0.6	11.5	3.5
Annual	2.6	253.3	8.6	1.7	1.7	65	15.3

Source: The Oregon Climate Service, "Climate of Clackamas County."

http://ocs.oregonstate.edu/county_climate/Clackamas_files/Clackamas.html#table4

Since 2001 there have been thirteen heavy rain events, six hail events, and sixteen flood events in Clackamas County that have been reported by the NOAA Satellite and Information Service center.¹⁵ Since 2009 there have been two major flood events in Clackamas County which have both resulted in Presidential Disaster Declarations.¹⁶ When the county experiences storm events that include heavy rain events in a very short amount of time, the likelihood of flooding and landslides increases. The most common landslide types, slides and flows, have occurred after several hours or, in some cases, several days of heavy rain or rapid snow melt. Flows may occur hours after the period of the heaviest rain in a storm.¹⁷

¹⁴ Loy, W. G., ed. 2001. *Atlas of Oregon*, 2nd Edition. Eugene, OR: University of Oregon Press.

¹⁵ NOAA Satellite and Information Service. Accessed 2 December 2011.

<http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>.

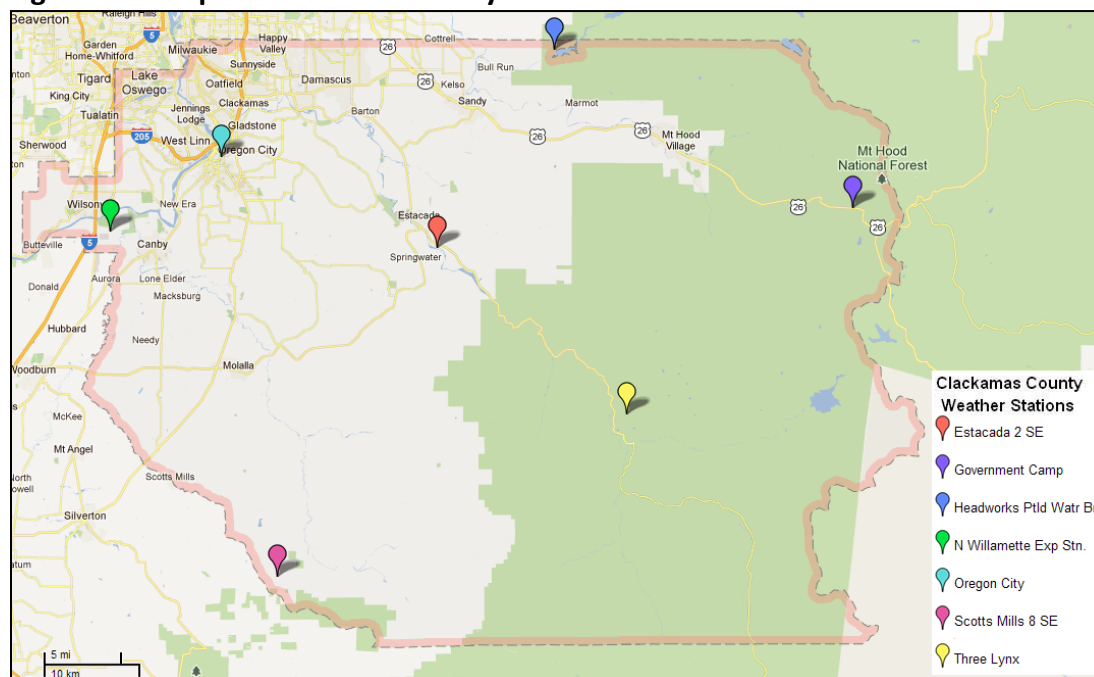
¹⁶ FEMA, Oregon Disaster History. Accessed 18 December 2011.

http://www.fema.gov/news/disasters_state.fema?id=41.

¹⁷ Oregon Geology: Landslide Hazards in Oregon. Accessed 15 December 2011.

<http://www.oregongeology.com/sub/publications/landslide-factsheet.pdf>.

Figure 2.1: Map of Clackamas County Weather Station Locations



Source: Map: Online Google Map Query, 2012

Source: Weather Stations: World Climate. Accessed 9 January 2012. <http://www.worldclimate.com/>.

Hazard Severity

Situated in the Willamette Valley with the Cascades just off to the east, the county is susceptible to a variety of storms that can affect residents and damage property. Typical hazards to affect the county include floods, landslides, wildfires, severe winter storms, windstorms, earthquakes, and volcanic eruptions. While the entire county is susceptible to all these types of natural hazards, the hamlets and villages located around the Mount Hood vicinity seem to be most affected by seasonal floods that are characterized by periods of heavy rains in a short amount of time, as well as a hard snowfall and ice storm immediately followed by warm temperatures causing that fresh snow to melt at a faster rate. With the amount of volcanic sediment that has settled in the streams and valleys over the years since Mount Hood's last eruption, the houses located in this vicinity are vulnerable to landslides and floods as the water permeates in the soil more easily; another factor to consider is the erosive behavior of the Sandy River's migrating channel. As this part of the county is mostly forested, wildfires also affect this area.

Land Cover

More than half of the land in Clackamas County is federally owned by either the BLM (6%) or the US Forest Service (45%). Comparatively, Clackamas County has a higher percentage of privately owned land, as well as federally owned, US Forest Service land, while all other land ownerships are significantly lower than state totals.¹⁸ Table 2.4 provides the total amount of land ownership in Clackamas County by category, measured in thousands of acres.

¹⁸ Loy, W. G., ed. 2001. *Atlas of Oregon*, 2nd Edition. Eugene, OR: University of Oregon Press.

Table 2.4: Land Ownership in Thousands of Acres

	Private	% of Total	BLM	% of Total	USFS	% of Total	State	% of Total	Other	% of Total	Total Land
Clackamas	558	46%	74	6%	545	45%	12	1%	18	1%	1,207
Oregon	27,181	44%	15,715	25%	15,643	25%	1,557	3%	1,832	3%	61,928

Source: Atlas of Oregon, 2nd Edition, Pg. 84 (2001).

The eastern portion of the county is mostly rural and is where most of the US Forest Service owns their land. On the contrary, the western portion of the county is more urbanized with a higher percentage of privately owned land. The western portion also includes zoning for agriculture, forest, rural exception, and the urban growth boundary; a vast majority of this portion of the county is either included in the Urban Growth Boundary or is designated as rural reserve.¹⁹

According to the *Willamette Valley Land Use/Land Cover Map Informational Report*, a majority of the land cover that includes farmland used for production of tree fruits, vineyards, berries, Christmas trees, and nursery stock can be found in Clackamas County.²⁰ The report goes on to discuss that the valley portion of the county can be characterized by row crops in the bottomland along the Willamette, Pudding, and Molalla Rivers, with its upland areas characterized by a combination of all the agricultural cover types.²¹ Because this area is interlaced with all types and sizes of creeks and swales, the land drains better here, than the rest of the Willamette Valley.²² The foothill areas leading into the Cascade Range can be characterized by rural non-farm small parcels that are agriculture lands with little or no management, as well as large parcels that are being, or have been, broken to make smaller ranches for single-family dwellings.²³ The foothill area in the Cascade Range has also seen a conversion from all types of forested areas to Christmas tree plantations and solid Douglas Fir Forest.²⁴

Other Significant Geologic Features

Clackamas County, like most of the Pacific Northwest, lies over the area of Cascadia Subduction Zone where the North American crustal plate overrides the Juan de Fuca plate underneath the earth's crust. The fault along these two plates creates a structural sag at the Willamette River Valley. Volcanoes are present along this structural sag, and the activity on these mountains is caused by the buoyant melted rock of the Juan de Fuca plate, as it rises to the surface.

¹⁹ Loy, W. G., ed. 2001. *Atlas of Oregon*, 2nd Edition. Eugene, OR: University of Oregon Press.

²⁰ "Willamette Valley Land Use/Land Cover Map Informational Report," Pg. 25. Accessed 19 December 2011.

<http://nwhi.org/inc/data/gisdata/docs/willamette/wvveg24k.pdf>.

²¹ Ibid.

²² Ibid.

²³ Ibid.

²⁴ Ibid.

Minerals and Soils

The characteristics of the minerals and soils present in Clackamas County indicate the potential types of hazards that may occur. Rock hardness and soil characteristics can determine whether or not an area will be prone to geologic hazards such as earthquakes and landslides. Some of Oregon's richest soils are located in areas surrounding Canby, Sandy, Molalla, and Wilsonville. In fact, 87% of non-urban soil is classified as productive, agricultural land. These deep alluvial soils are rich in minerals and are great for agriculture, but serve to amplify the effects of earthquakes. Steep slopes toward the Cascade Range increase the potential for landslides. The four mineral and soil types in Clackamas County are valley fill and semi-consolidated sedimentary rocks, basaltic lavas, marine sedimentary rocks, and Eocene-age volcanic and sedimentary rocks.²⁵

The surface material includes unconsolidated, fine-grained deposits of Willamette silt, sand, gravel, and recent floodplain deposits. Torrential flood events can introduce large deposits of sand and gravel. Sandy silt and silt containing clay are moderately dense and firm, and are primarily considered to be prone to liquefaction, an earthquake related hazard. Basaltic lava consists mainly of weathered and non-weathered, dense, fine-grained basalt. Though the characteristics of this lava may offer solid foundation support, landslides are common in many of these areas where weathered residual soil overlies the basalt. Understanding the geologic characteristics of Clackamas County is an important step in mitigation and avoiding at-risk development.²⁶

Synthesis

This natural environment capacity section is composed of elements known as natural capital. Natural capital is essential in sustaining all forms of life including human life and plays an often under represented role in community resiliency to natural hazards. The growing population and increased development in Clackamas County increases its risk from natural hazard events by threatening loss of life, property, and long-term economic disruption.

With mild temperatures and diverse terrain, the most typical natural hazards that affect Clackamas County are widespread heavy rain events followed by major flood events, as well as the occasional wildfire. With eminent hazard events such as these, it is important that the county is able to react in the event that the county's water supply, supplied by several of the major rivers flowing throughout, is heavily impacted by disaster.

Oregon City experiences an annual mean temperature of 55°F, and the average of the annual amount of precipitation for parts of the county range from an average of 89 feet per year in Government Camp down to an average of 43 feet per year at the North Willamette Experiment Station near Canby. Contrastingly, snowfall rates are drastically different with Government Camp seeing an annual average of 253 feet of snow, while the North Willamette Experiment Station will only see an average of two feet of snow.

²⁵ Schlicker, Herbert G. and Deacon, Robert J., Engineering geology of the Tualatin Valley Region, Oregon (1967), (Bulletin 60). Oregon: Department of Geology and Mineral Industries.

²⁶ Ibid.

Highlighting natural capitals such as key river systems, as well as temperature and precipitation patterns, will allow the county to identify key hazard areas that need to be better prepared for and mitigated, to increase the resiliency of each community.

Socio Demographic Capacity

Population

Clackamas County is the third largest county in the state of Oregon in terms of population. With 375,992 residents, resiliency and hazard mitigation efforts are a lot harder to manage. The US Census Bureau reported that in 2000 the population of the county was 338,391. With an increase in 11.1% in population growth since 2000, the county experienced an average annual growth rate of 1.1%. These figures both were below the change experienced by the state of Oregon as a whole. Table 2.5 describes the Population Growth throughout Clackamas County and its surrounding counties.

Table 2.5: County Population Growth from 2000 to 2010

County	Population (2010)	Population (2000)	Population Change (2000-2010)	Percent Change (2000-2010)	Average Annual Growth Rate
Clackamas	375,992	338,391	37,601	11.1%	1.1%
Hood River	22,346	20,411	1,935	9.5%	1.0%
Marion	315,335	284,834	30,501	10.7%	1.1%
Multnomah	735,334	660,486	74,848	11.3%	1.1%
Wasco	25,213	23,791	1,422	6.0%	0.6%
Washington	529,710	445,342	84,368	18.9%	1.9%
Yamhill	99,193	84,992	14,201	16.7%	1.7%
Oregon	3,831,074	3,421,399	409,675	12.0%	1.2%

Source: US Census Bureau, 2000 and 2010 Demographic Profile Data, DP-1.

While the county only experienced an 11.1% increase in population from 2000 to 2010, some of the incorporated cities throughout Clackamas experienced significant growth. Below, Table 2.6 represents population growth for incorporated cities throughout Clackamas County. The city of Happy Valley experienced the biggest growth with an average annual growth rate of 20.8% and an increase of 208% since 2000 with a current population of 13,903. Lake Oswego, the county's most populated city at 36,619 residents, increased by about 4% since 2000. The city of Sandy almost doubled in size and is now at a population of 9,570. The county seat, Oregon City increased by 24% and currently has a population of 31,859. Four cities, Barlow, Johnson City, Milwaukie, and Rivergrove, saw slight decreases in population.

Table 2.6: Incorporated Cities Population Growth from 2000 to 2010

City	Population (2010)	Population (2000)	Population Change (2000- 2010)	Percent Change (2000- 2010)	Average Annual Growth Rate
Barlow	135	140	-5	-3.6%	-0.4%
Canby	15,829	12,790	3,039	23.8%	2.4%
Damascus*	10,539	9,611	928	9.7%	1.0%
Estacada	2,695	2,371	324	13.7%	1.4%
Gladstone	11,497	11,438	59	0.5%	0.6%
Happy Valley	13,903	4,519	9,384	207.7%	20.8%
Johnson City	566	634	-68	-10.7%	-1.1%
Lake Oswego	36,619	35,278	1,341	3.8%	0.4%
Milwaukie	20,291	20,490	-199	-1.0%	-0.1%
Molalla	8,108	5,647	2,461	43.6%	4.4%
Oregon City	31,859	25,754	6,105	23.7%	2.4%
Rivergrove	289	324	-35	-10.8%	-1.1%
Sandy	9,570	5,385	4,185	77.7%	7.8%
West Linn	25,109	22,385	2,724	12.2%	1.2%
Wilsonville	19,509	13,991	5,518	39.4%	3.9%
Clackamas County	375,992	338,391	37,601	11.1%	1.1%

Source: US Census Bureau, 2000 and 2010 Demographic Profile Data, DP-1, and US Census Bureau, 2006 Population Estimates, T1.

*Damascus data is from 2005 to 2010

Population size itself is not an indicator of vulnerability; other factors such as location, composition, and capacity of the population within the county also need to be considered. Research by social-scientists demonstrates that human capital such as language, race, age, income, education, and health can affect the integrity of a community, and therefore can impact community resilience to natural hazards.

Language

Special consideration should be given to populations who do not speak English as their primary language. Non-English speaking populations can be harder to reach with preparedness and mitigation information and materials.²⁷ Table 2.7 lists the languages spoken in Clackamas County homes. It shows that 11% of the population speaks a language other than English. Though this is a low percentage, what needs to be highlighted is that of those who speak another language, a large portion of those populations are not proficient in English. For example, 5.5% of the county speaks Spanish, of this 5.5%, 48.2% of them are not proficient in English.

²⁷ State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

Table 2.7: Clackamas County Language Barriers, 2010

Language Spoken at Home	Total Number of Speakers	Number of People not Proficient in English	Percent of People not Proficient in English
Population 5 years and over	355,782	-	-
English only	316,097	-	-
Language other than English	39,685	15,682	39.5%
Spanish	19,439	9,364	48.2%
Other Indo-European Languages	11,221	2,535	22.6%
Asian and Pacific Islander Languages	8,209	3,527	43.0%
Other	816	256	31.4%

Source: US Census Bureau, 2010 American Community Survey 1-year Estimates, DP02

Race and Ethnicity

The impact in terms of loss and ability to recover may also vary among minority population groups following a disaster. Racial and ethnic minorities can be more vulnerable to natural disaster events as historic patterns of inequality among racial or ethnic divides have often resulted in minority communities that are more likely to live in inferior building stock, degraded infrastructure, or less access to public services. Table 2.8 describes Clackamas County's population by race while Table 2.9 describes the county's population by ethnicity.

Table 2.8: Race in Clackamas County, 2010

Race	Count	Percent of Population
Total Population	375,992	
One Race	364,127	96.8%
White	331,571	88.2%
Black or African American	3,082	0.8%
American Indian or Alaska Native	3,122	0.8%
Asian	13,729	3.7%
Native Hawaiian and other Pacific Islander	867	0.2%
Other	11,756	3.1%
Two or more Races	11,865	3.2%

Source: US Census Bureau, 2010 Demographic Profile Data, DP-1.

Table 2.9: Ethnicity in Clackamas County, 2010

Ethnicity	Count	Percent of Population
Total Population	375,992	
Hispanic or Latino (of any race)	29,138	7.7%
Not Hispanic or Latino	346,854	92.3%

Source: US Census Bureau, 2010 Demographic Profile Data, DP-1.

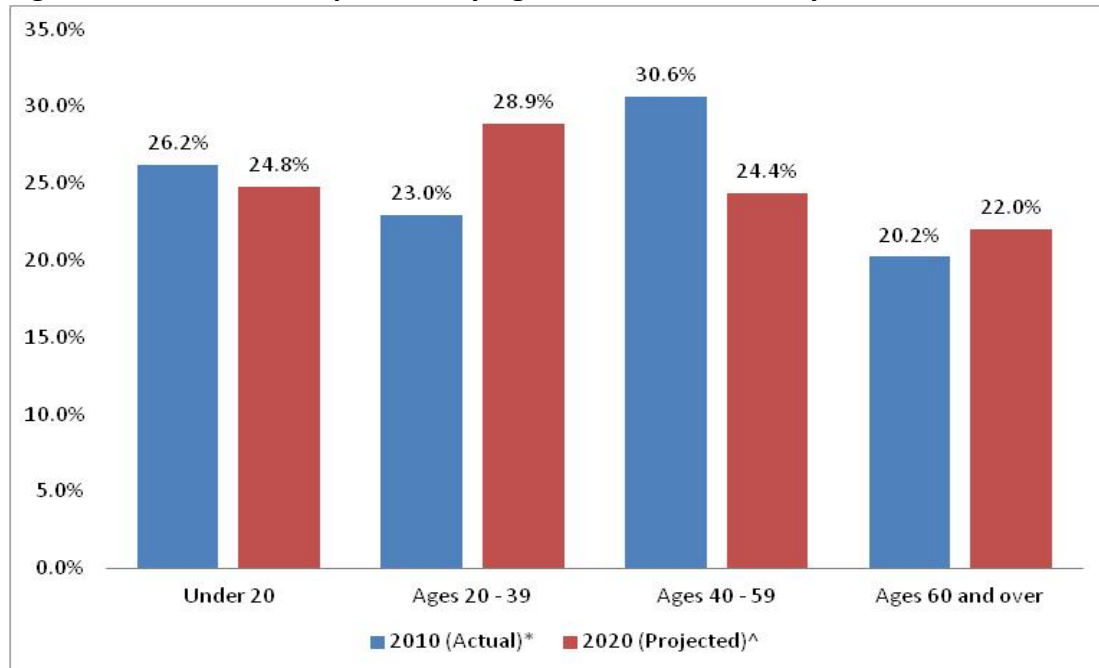
Both tables indicate that there is a fairly small minority population throughout the county. The county has a significantly large population, 88.2%, that racially identifies themselves as White; 8.6% identify as non-white, one race, with the remaining 3.2% who identify as two or more races. Ethnically, only 7.7% of the population identify themselves as Hispanic or

Latino, with the remaining 92.3% identifying as not Hispanic or Latino. It will still be important for the county to identify specific ways to support all portions of the community through hazard preparedness and response, such as providing preparedness handouts and presentations in the languages spoken by the population which can increase community resilience.

Age

Age is a very important factor which has a direct impact on what actions are prioritized for mitigation and how responses to hazard incidents are carried out. Young people represent a potentially vulnerable segment of the population. Special considerations should be given to young populations and schools, where children spend much of their time, during the natural hazard mitigation process. Likewise, the elderly population may require special consideration due to increased sensitivities to heat and cold, possible reliance upon transportation for medications, and comparative difficulty in making home modifications that reduce risk to hazards. Figure 2.2 illustrates the current and projected percentage of population by age groups within the county. Currently the county has a higher population of individuals ages 40-59 at 30.6% of the population. It is projected that by 2020, individuals ages 20-39 will be a majority of the population at 28.9%. For the county, this suggests that they should equally be reaching out to all age groups as with each decade the majority age will fluctuate.

Figure 2.2: Percent of Population by Age in Clackamas County for 2010 and 2020



Source*: 2010 (Actual): US Census Bureau, 2010 Demographic Profile Data, DP-1.

Source^: 2020 (Projected): Office of Economic Analysis, Department of Administrative Services, State of Oregon, Released April 2004.

Table 2.10 identifies the percent of population by age in each of the county's incorporated cities. What we can learn from this table is that the county percentages and the City percentages of age groups are almost identical. About half of the incorporated cities have

the highest percentage of populations in the age group, *Under 20*, while the rest of the cities have the highest percentage in the age group, *Ages 40-59*.

Table 2.10: Percent of Population by Age in Incorporated Cities, 2010

City	Under 20	Ages 20 - 39	Ages 40 - 59	Ages 60 and over
Barlow	34.1%	20.0%	27.4%	18.5%
Canby	31.1%	23.6%	25.9%	19.3%
Damascus	27.4%	17.3%	32.9%	21.4%
Estacada	29.1%	27.0%	26.3%	17.6%
Gladstone	26.0%	25.2%	29.6%	19.2%
Happy Valley	32.5%	22.8%	31.7%	13.0%
Johnson City	21.7%	18.6%	31.1%	28.6%
Lake Oswego	23.9%	17.9%	33.8%	24.3%
Milwaukie	22.9%	27.2%	30.0%	19.9%
Molalla	33.4%	30.4%	22.8%	13.4%
Oregon City	28.2%	27.4%	27.9%	16.4%
Rivergrove	22.5%	11.8%	40.1%	25.6%
Sandy	31.9%	29.2%	24.8%	14.1%
West Linn	28.4%	19.1%	34.5%	18.0%
Wilsonville	24.0%	31.7%	26.4%	17.9%

Source: US Census Bureau, 2010 Demographic Profile Data, DP-1.

Other important considerations for high risk populations are the number of people over the age of 64 living alone and single parent households with children under 18. Table 2.11 identifies all High Risk Households in Clackamas County. While a large percentage of households have individuals under 18 or individuals over 65, it is the 9.3% of householders who are 65 years and older living alone and the 7.9% of single parent households with children under 18. These populations will likely require additional support during a disaster and could result in strains on the system if strategies to mitigate these population vulnerabilities are not implemented.

Table 2.11 High Risk Households in Clackamas County, 2010

High Risk Households	Clackamas County	Percent of Households
Total Households	145,790	
Households with individuals under 18	47,821	32.8%
Single householder with own children under 18	11,483	7.9%
Households with individuals 65 and over	36,935	25.3%
Householder 65 years and older living alone	13,486	9.3%

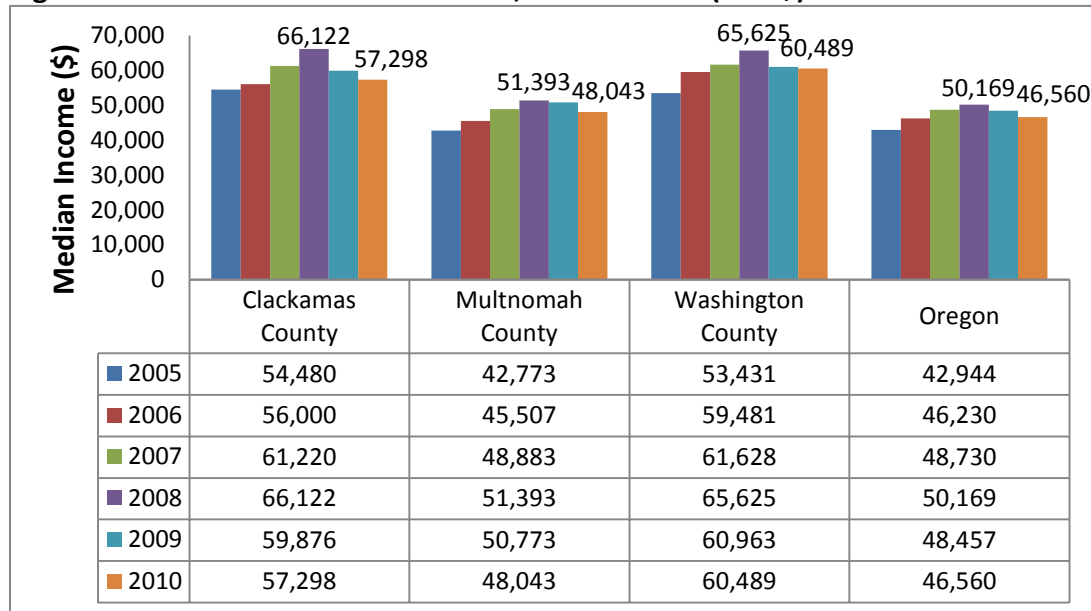
Source: US Census Bureau, 2010 Demographic Profile Data, DP-1.

Income

Household income and poverty status levels are some other indicators of socio demographic capacity and the stability of the local economy. The median household income throughout Clackamas County is \$57,298 which is significantly higher than the state average. Figure 2.3 illustrates the changes in median household income from 2005 to 2010 in Clackamas

County, Multnomah County, and Washington County. Data shows that 2008 peaked as the highest median income for all counties, including the state. The median household income has since dropped each year since its peak with data also showing the current median household income. Table 2.12 also shows that of all three counties, Clackamas has significantly seen the least amount of change in Median Household Income since 2005 with only a 5.2% increase.

Figure 2.3: Median Household Income, 2005 to 2010 (U.S. \$)



Source: US Census Bureau, Selected Economic Characteristics, 2005-2010, 1-year Estimates, DP03.

Table 2.12: Median Household Income, 2005-2010 (U.S. \$)

	2005	2006	2007	2008	2009	2010	Percent Change from 2005 to 2010	Average Annual Growth Rate
Clackamas County	54,480	56,000	61,220	66,122	59,876	57,298	5.2%	1.9%
Multnomah County	42,773	45,507	48,883	51,393	50,773	48,043	12.3%	2.3%
Washington County	53,431	59,481	61,628	65,625	60,963	60,489	13.2%	2.5%
Oregon	42,944	46,230	48,730	50,169	48,457	46,560	8.4%	1.6%

Source: US Census Bureau, Selected Economic Characteristics, 2005-2010, 1-year Estimates, DP03.

Low-income populations may require additional assistance following a disaster because they may not have the savings to withstand economic setbacks, and if work is interrupted, housing, food, and necessities become a greater burden. Additionally, low-income households are more reliant upon public transportation, public food assistance, public housing, and other public programs, all which can be impacted in the event of a natural disaster. Table 2.13 details the number of families below poverty level in Clackamas County. Although the percentages of families, as well as families with children under 18 below poverty are lower than both the state and Nation, it is still important to consider their needs in resiliency and mitigation efforts.

Table 2.13: Families Below Poverty Level, 2010

	Families Below Poverty in 2010			
	Families	Percent of Population	Families with Children Under 18	Percent of Population
Clackamas County	38,265	10.2%	10,807	12.2%
Oregon	596,408	15.8%	183,859	21.6%
United States	46,215,956	15.3%	15,749,129	21.6%

Source: US Census Bureau, 2010 American Community Survey, 1-year Estimates, S1701

Additionally, while Clackamas County has the second highest median household income between the three largest counties (Clackamas, Multnomah, and Washington) they have the lowest percentage of Public School Children eligible to receive free or reduced lunch. Table 2.14 shows the distribution and percentage of children who are eligible to receive these lunches from 2005 to 2010.

Table 2.14: Percent of Public School Children Eligible to Receive Free/Reduced Lunch During the School Year, 2005-2012

School Year	2005	2006	2007	2008	2009	2010	Change from 2005 to 2010
Clackamas County	27.0%	27.8%	26.7%	27.5%	30.5%	35.4%	Up 8.4%
Multnomah County	49.0%	48.0%	48.0%	47.6%	51.8%	54.4%	Up 5.4%
Washington County	30.0%	31.1%	31.7%	36.2%	36.9%	40.3%	Up 10.3%
Oregon	42.0%	42.6%	42.1%	36.2%	47.0%	54.1%	Up 12.1%

Source: Children First for Oregon, Status of Oregon's Children County Data Book, Years 2005-2010

Education

Educational attainment is another important factor that influences socio demographic capacity. Table 2.15 describes the education attainment throughout Clackamas County. Compared to the state, the county has a higher percentage of high school graduates, as well as a higher percentage of individuals who have obtained a Bachelor's degree or higher.

Table 2.15: Education Attainment in Clackamas County, 2010

	Clackamas County		Oregon	
	Count	Percent of Population	Count	Percent of Population
Population 25 years and over	259,973		2,614,886	
High school graduate or higher	236,658	91.00%	2,320,749	88.80%
Bachelor's degree or higher	77,263	29.70%	751,803	28.80%

Source: US Census Bureau, 2010 American Community Survey, 1-year Estimates, DP02

Educational attainment often reflects higher income and therefore higher self-reliance. Widespread educational attainment is also beneficial for the regional economy and employment sectors as there are potential employees for professional, service, and manual labor workforces.

Health

Individual and community health play an integral role in community resiliency. A variety of indicators such as health insurance, people with disabilities, and crime rate translate to the county's ability to prepare, respond, and cope with the impacts of disaster. Analyzing health insurance coverage and people with disability throughout the county will help determine the amount of special attention needed for these vulnerable populations during a disaster.

Those who lack health insurance coverage or who have a disability will often require more additional county support and resources and have a higher vulnerability to hazards. Table 2.16 illustrates the amount of health insurance coverage across the county. The US Census reports that 87% of the population in Clackamas is insured which is higher than both the state and the Nation.²⁸

Table 2.16: Health Insurance Coverage, 2010

	Population with Health Insurance	Percent of Population	Population without Health Insurance	Percent of Population
Clackamas County	326,628	87.0%	48,947	13.0%
Oregon	3,147,603	82.9%	651,504	17.1%
United States	257,079,614	84.5%	47,208,222	15.5%

Source: US Census Bureau, 2010 American Community Survey, 1-year Estimates, DP03

Those with a disability face a high risk of vulnerability and response effort in a time of disaster. Below, Table 2.17 describes the disability status throughout Clackamas County. While only a small percentage of the total population has a disability, 12.6%, about 37% of those with disabilities are over the age of 65.

Table 2.17: Clackamas County Disability Status, 2010

	2010 Estimates	Percent of Population
Population	375,575	-
With a Disability	47,166	12.6%
Population Under 18 years	89,324	-
With a Disability	5,200	5.8%
Population 18 to 64 years	235,629	-
With a Disability	23,249	9.9%
65 years and over	50,662	-
With a Disability	18,717	37.0%

Source: US Census Bureau, 2010 American Community Survey, 1-year Estimates, DP02

Crime rate is another indicator of the county's overall health. Looking at the crime rate in Clackamas County, can determine whether or not special attention needs to be made during a disaster towards troublesome areas or populations. Table 2.18 shows that the violent crime rate in Clackamas County is lower than the other two surrounding counties, Multnomah and Washington, as well as the state as a whole. Although the crime rate is

²⁸ US Census Bureau, 2010 American Community Survey, 1-year Estimates, DP03.

relatively low, in times of disaster and in combination with a high stress environment an increase in crime incidents may occur.

Table 2.18: Crime Rate, 2006-2008

	Aggregate Population from 2006-2008	Violent Crimes 2006-2008	Violent Crime Rate per 100,000 people
Clackamas County	1,128,969	1,406	125
Multnomah	2,101,898	12,742	606
Washington	1,532,863	2,491	159
Oregon	N/A	N/A	275

Source: Oregon Health Authority, County Health Rankings, Violent Crime Rate

Synthesis

Socio demographic capacity is a significant indicator of county hazard resiliency. Clackamas County is the third largest county in the state of Oregon, in terms of population. With 375,992 residents, resiliency and hazard mitigation efforts can be a lot harder to manage. The characteristics and qualities of the community population such as age, race, education, income, and health and safety are significant factors that can influence the county's ability to cope, adapt to, and recover from natural disasters. The current status of socio demographic capacity indicators can have long term impacts on the economy and stability ultimately affecting future resiliency of Clackamas County.

One important thing to consider is that there are a high number of residents who are not proficient in English. Of the residents that speak another language other than English, 39.5% are not proficient in English. Language barriers will often make it difficult to reach populations of residents who don't speak English. Resiliency efforts need to focus on targeting these populations as they will be most vulnerable and may have trouble knowing what to do in the event of a disaster. It is also important to think about the county's population in terms of its age groups; it is important to cater information towards each of these populations individually, as it is necessary to be able to reach out to all age groups. In 2010, the highest percentage of residents were aged 40-59 with the population aged under 20 following close behind; by 2020, those aged 20-39 will dominate the county. While disasters don't affect certain age groups more than others, information can be dispersed and catered depending on who may be the most vulnerable.

Clackamas County socio-economic factors to consider include:

- With a 5.2% growth from 2005 to 2010, the median household income across the county has increased to \$57,298
- 10.2% of the population is below poverty
- 12.2% of the population that is below poverty are families with children 18 years or younger
- 35.4% of public school children are eligible for free or reduced school lunches
- 87% of the county's residents have health insurance
- 12.6% of the population has a disability, where a majority, 37%, of this population is 65 years or older

Highlighting the above socio-economic factors and looking at the Socio Demographic Capacity of the county is important as it affects the resiliency of the county and helps determine target areas and potential vulnerable populations for increased notification on mitigation and resiliency efforts.

Regional Economic Capacity

Economic resilience to natural disasters is far more complex than merely restoring employment or income to the local community. Building a resilient economy requires an understanding of how the component parts of employment sectors, workforce, resources and infrastructure are interconnected in the existing economic picture. Once any inherent strengths or systematic vulnerabilities become apparent, both the public and private sectors can take action to increase the resilience of the local economy.

Regional Affordability

The evaluation of regional affordability supplements the identification of socio-demographic capacity indicators, i.e. median income, and is a critical analysis tool to understanding the economic status of a community. This information can capture the likelihood of individuals' ability to prepare for hazards, through retrofitting homes or purchasing insurance. If the county reflects high income inequality or housing cost burden, the potential for home owners and renters implementing mitigation can be drastically reduced. Regional affordability is a mechanism for generalizing the abilities of community residents to get back on their feet without Federal, state or local assistance.

Median Income

Median Income can be used as an indicator of the strength of a region's economic stability. Table 2.19 shows that between 1999 and 2009, the median household in Clackamas County has risen slower than both the state and the Nation, even though the county's median income is higher than both the state and National averages.

Table 2.19: Median Household Income, 1999 and 2009

	1999*	2009^	Change	Average Annual Growth Rate
Clackamas County	\$52,080	\$60,051	\$7,971	1.4%
Oregon	\$40,916	\$48,325	\$7,409	1.7%
United States	\$41,994	\$50,221	\$8,227	1.8%

Source*: US Census Bureau, Profile of General Demographic Characteristics: 2000, DP-1

Source^: US Census Bureau, State and County QuickFacts, 2010 Census

Income Inequality

Income equality is a measure of the distribution of economic resources, as measured by income, across a population. It is a statistic defining the degree to which all persons have the same income. Values that are closer to 1 signify a more equal distribution of income while values that are closer to zero signify more unequal distribution of income.²⁹

²⁹ US Census Bureau, Income, Narrative (Middle Class). Accessed 30 December 2011.
<http://www.census.gov/hhes/www/income/data/inequality/middleclass.html>.

Clackamas County's level of income equality is noticeably higher than both the state and National average as depicted in Table 2.20. As a point of reference, out of all the Counties in Oregon (for which data is available), the highest income equality rating is represented by Yamhill County at 0.62, while Benton County represents the lowest at 0.5.³⁰

Table 2.20: Income Equality, 2010

	Income Equality
Clackamas County	0.57
Oregon	0.55
United States	0.53

Source: US Census Bureau, 2010 American Community Survey, Gini Index of Income Inequality, B19083

Housing Affordability

Housing affordability is a measure of economic security gauged by the percentage of a metropolitan area's households paying less than 35% of their income on housing.³¹ Households spending more than 35% are considered housing cost burdened. Table 2.21 displays the percentage of both home owners and renters which reflect the housing cost burden in Clackamas County, as well as the averages for Oregon and the United States as a whole. In general, the population that spends more of their income on housing has proportionally fewer resources and less flexibility for alternative investments in times of crisis.³²

High incidence of housing cost burden can impose serious challenges for a community recovering from a disaster, as housing costs may exceed the ability of local residents to repair or move to a new location. Clackamas County has a higher amount of homeowners paying more than 35% of their income on housing compared to the state and the Nation. However, the number of renters paying more than 35% of income on housing is about the same as the Nation and just slightly lower than the state.

Table 2.21: Households Spending >35% of Income on Housing, 2010

	Owners*	Renters^
Clackamas County	27.1%	40.6%
Oregon	25.7%	43.5%
United States	23.4%	40.4%

Source*: US Census Bureau, 2010 American Community Survey, 1-year Estimates, B25091.

Source^: US Census Bureau, 2010 American Community Survey, 1-year Estimates, B25070.

³⁰ US Census Bureau, 2010 American Community Survey, Gini Index of Income Inequality, B19083.

³¹ University of California Berkeley, Building Resilient Regions, Resilience Capacity Index. Accessed 30 December 2011. <http://brr.berkeley.edu/rci/>.

³² Ibid.

Economic Diversity

Economic diversity is a general indicator of an area's fitness for weathering difficult financial times. One method for measuring economic diversity is through use of the Hachman Index, a formula that compares the composition of county and regional economies with those of states or the nation as a whole. Using the Hachman Index with the state of Oregon, a diversity ranking of 1 indicates the Oregon county with the most diverse economic activity compared to the state as a whole, while a ranking of 36 corresponds with the least diverse county economy.

Table 2.22 illustrates that Clackamas County ranks number 1 in terms of economic diversity out of all of Oregon's 36 counties. Clackamas County sits beside neighboring Counties, Multnomah which is ranked number 2 and Washington, ranked number 7.

Table 2.22 County Hachman Index Scores, 2009

County	2009 Hachman Index Score	State Rank
Clackamas County	0.855	1
Multnomah County	0.838	2
Washington County	0.656	7

Source: Oregon Employment Department

While illustrative, economic diversity does not guarantee economic vitality or resilience. For example, as of 2011, though Clackamas County and neighboring Multnomah County are ranked 1 and 2, respectively in terms of economic diversity in the state as a whole, they are both listed as "economically distressed" by the Oregon Business Development Commission.³³ The economic distress measure is based on indicators of decreasing new jobs, average wages and income, and is associated with an increase of unemployment.

Employment and Wages

Data provided by the US Census indicate that Clackamas County's labor force (defined as the population of 16 years and older which are in the labor force) increased 5% from 178,724 in 2000 to 199,046 in 2010.³⁴ With a decrease in the unemployment rate from 2009, the county is still below the state's rate at 10.1% for the county. Table 2.23 shows that both neighboring counties also experienced a decrease in the unemployment rate as well.

³³ Business Oregon, Oregon Economic Data, *Distressed Areas in Oregon*. Accessed 30 December 2011. <http://www.oregon4biz.com/Oregon-by-the-numbers/oregon-economic-data/Distressed-Areas-in-Oregon/>.

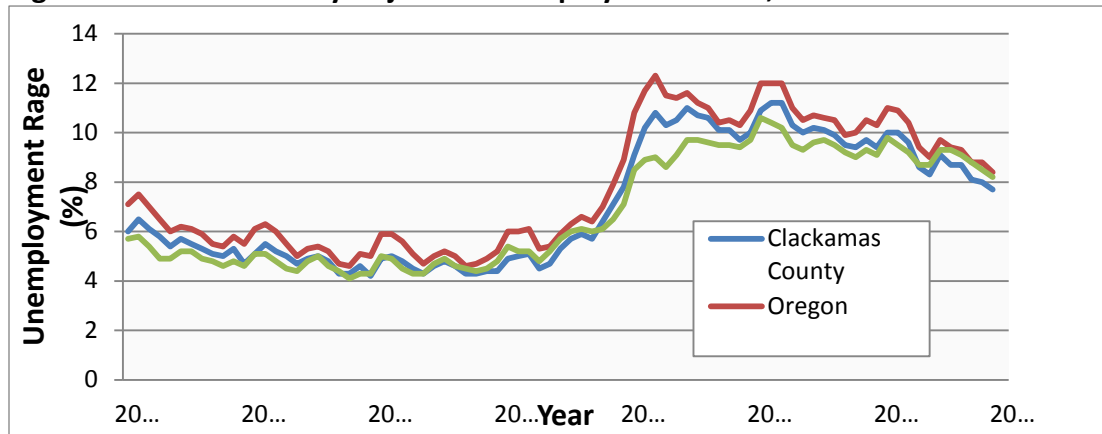
³⁴ US Census Bureau, Selected Economic Characteristics, 2000 and 2010, DP-3 and DP03.

Table 2.23: Regional Unemployment, 2010

County	2010 Unemployment Rate	Percent Change from 2009
Clackamas County	10.1	-1.9%
Multnomah County	10.1	-2.9%
Washington County	9.1	-3.2%
Oregon	10.8	-2.7%

Source: Oregon Employment Department, *Local Area Employment Statistics*.
<http://www.qualityinfo.org/olmisj/labforce>

Employment data from the Oregon Employment Department demonstrate that the unemployment rate has remained fairly stable since 2009 with the biggest increase occurring at the end of 2008 and well into 2009. Figure 2.4 shows the gradual increase in the Unemployment Rate throughout Clackamas County compared the Oregon and the United States. While the county follows the national trend, in 2008 the unemployment rate was lower than both the state and Nation and then gradually rose in 2009 and 2010 to be higher than the National average. Towards the end of 2011 you can see that the unemployment rate for the county has once again dipped below both the state and National levels.

Figure 2.4 Not Seasonally Adjusted Unemployment Rates, 2005-2011

Source: Oregon Employment Department, *Local Area Unemployment Statistics*.
<http://www.qualityinfo.org/olmisj/labforce>

As opposed to measurements of the labor force and total employment, Covered Employment provides a quarterly count of all employees covered by Unemployment Insurance. Table 2.24 displays the county Covered Employment and Payroll numbers for Clackamas County, its surrounding counties, and the state in 2010. While the average pay for employees in Clackamas County was \$42,153 and lower than neighboring counties, Multnomah and Washington, it was remained than the state's average pay. Clackamas County also has a significantly lower number of employees than both surrounding counties.

Table 2.24: County Covered Employment and Payroll, 2010

County	# of Employees	Annual Payroll	Average Pay
Clackamas County	136,805	\$5,766,675,559	\$42,153
Multnomah County	421,452	\$19,898,507,268	\$47,214
Washington County	234,762	\$12,675,106,283	\$53,991
Oregon	1,598,642	\$66,613,214,679	\$41,669

Source: Oregon Employment Department, 2010 Oregon Covered Employment and Wages.

Industry

MAJOR REGIONAL INDUSTRY

Key industries are those that represent major employers, major revenue generators, and for the purposes of hazard mitigation planning, industries that are represented by a high number of businesses. Different industries face distinct vulnerabilities to natural hazards, as illustrated by the industry specific discussions below. Identifying key industries in the region enables communities to target mitigation activities towards those industries' specific sensitivities.³⁵

It is important to recognize that the impact that a natural hazard event has on one industry can reverberate throughout the regional economy. The effect is especially great when the businesses concerned belong to a basic sector industry. Basic sector industries are those that are dependent on sales outside of the local community; they bring money into a local community via employment. The farm and ranch, information, and wholesale trade industries are all examples of basic industries. Non-basic sector industries are those that are dependent on local sales for their business, such as retail trade, construction, and health and social assistance.³⁶

EMPLOYMENT BY INDUSTRY

Table 2.25 identifies employment by industry. The four industries in Clackamas County with the most employees, as of 2011, are Government (12.4%), Health and Social Assistance (12.1%), Retail (11.9%), and Manufacturing (11.4%). Only one industry in the top five of Clackamas County's primary employment, Manufacturing, is of the basic nature and dependent to a large degree on sales outside of the local community. Basic industries encourage growth in non-basic industries and bring wealth into communities from outside markets. However, a high dependence on basic industries can lead to severe difficulties when recovering from a natural disaster if vital infrastructure or primary resource concentrations have been greatly damaged.

³⁵ State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

³⁶ Ibid.

Table 2.25: Total Covered Employment by Industry, 2010

Industry	Employment	Percent Employment
Government	16,970	12.4%
Health and Social Assistance	16,599	12.1%
Retail	16,322	11.9%
Manufacturing	15,559	11.4%
Professional and Business Services	15,043	11.0%
Leisure and Hospitality	12,787	9.3%
Wholesale	10,305	7.5%
Construction	8,305	6.1%
Financial Activities	6,908	5.0%
Other Services	5,304	3.9%
Transportation, Warehousing and Utilities	4,282	3.1%
Natural Resources and Mining	4,053	3.0%
Education	2,218	1.6%
Information	2,092	1.5%
Private Non-Classified	57	0.0%
Total Employment - All Industries	136,805	100%

Source: Oregon Employment Department, Covered Employment and Wages, Clackamas County, 2010.

The Oregon Employment Department estimates net employment growth between 2001 and 2010. Table 2.26 describes the total nonfarm employment by industry from 2005 to 2010. During this time, only one of the county's top five largest employers experienced growth. The county's Education and Health Services field experienced an increase of 19% while the others all significantly decreased. The second lowest employer, the Information Industry experienced the biggest growth at 1.3%.

Table 2.26: Total Nonfarm Employment by Industry, 2005 and 2010

Industry	Annual Average		Change from 2005 to 2010		
	2005	2010	Difference	Percent	AAGR
Mining and Logging	200	200	0	0.0%	0.00%
Construction	10,700	8,500	-2,200	-20.6%	-4.50%
Manufacturing	18,200	15,700	-2,500	-13.7%	-2.91%
Wholesale	10,200	10,200	0	0.0%	0.00%
Retail	17,200	16,300	-900	-5.2%	-1.07%
Transportation, Warehousing, and Utilities	5,800	4,400	-1,400	-24.1%	-5.38%
Information	1,600	2,100	500	21.3%	5.59%
Financial Activities	10,300	8,400	-1900	-18.4%	-4.00%
Professional and Business Services	15,700	15,000	-700	-4.5%	-0.91%
Education and Health Services	15,800	18,800	3,000	19.0%	3.54%
Leisure and Hospitality	12,600	12,800	200	1.6%	0.32%
Other Services	5,300	5,000	-300	-5.7%	-1.16%
Government	17,300	17,500	200	1.2%	0.23%
Total Annual Average Nonfarm Employment	140,900	134,900	-6,000	-4.3%	-0.87%

Source: Oregon Employment Department, Current Employment Statistics, Clackamas County Nonfarm Employment 2005 and 2010.

Overall, the county had a net loss of 6,000 jobs with three industries taking a majority of those losses: Construction (-2,200), Transportation, Warehousing, and Utilities (-2,500), and Financial Activities (-1,900). Over the five year period, Clackamas County experienced a decrease of 4.3% in non-farm employment.

HIGH REVENUE SECTORS

The top two nonfarm sectors with the highest known revenue reported in 2007 were Manufacturing (38.8%) and Retail (34.9%). Table 2.27 shows the revenue generated by each economic sector. All of the sectors combined generated more than \$14.6 billion in revenue for the county in 2007 (the most recent year for which data is available).

Table 2.27: Revenue of Nonfarm Sectors in Clackamas County, 2007

Sectors	Percent of Total Revenue
Manufacturing	38.8%
Retail	34.9%
Health Care and Social Assistance	11.7%
Accommodation and Food Services	4.2%
Real Estate and Rental and Leasing	3.9%
Administrative and Support and Waste Management and Remediation Services	3.3%
Other Services (Except Public Administration)	2.2%
Arts, Entertainment, and Recreation	0.7%
Educational Services	0.5%
Information	NA
Professional, Scientific, and Technical Services	NA
Total Revenue (in thousands)	\$14,606,010

Source: US Census Bureau, 2007 Economic Census, Table 1: Selected Statistics by Economic Sector: 2007.

The *Manufacturing* sector of Clackamas County brought in the most revenue during 2007, generating more than \$5.6 billion.³⁷ As revenue is dependent on how fast a product can be made and distributed to consumers, this sector is highly dependent on its facility. It is important to note that depending on the severity of a natural disaster and the pace of recovery, revenue generated from this sector could be greatly impacted during a natural hazard event.

The *Retail Trade* sector of Clackamas County brought in the second highest revenue in 2007, generating almost \$6 billion.³⁸ It contains small businesses that tend to be more sensitive to hazard induced costs. Retail trade is also largely dependent on wholesale trade and the transportation network for the delivery of goods for sale. Disruption of the transportation system could have severe consequences for retail businesses. The potential income from tourists also diminishes after a natural disaster as people are deterred from visiting the impacted area.³⁹

³⁷ US Census Bureau, Selected Statistics by Economic Sector: 2007, Table 1.

³⁸ Ibid.

³⁹ State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

In the event that the any of the county's primary revenue sectors are impacted by a disaster, Clackamas County may experience a significant disruption of economic productivity and should therefore plan accordingly.

REGIONAL INDUSTRY EMPLOYMENT FORECAST

During the hazard mitigation planning process, special attention also warranted to sectors that are anticipated to be major employers in the future. According to the Oregon Employment Department's *Employment Projections by Industry and Occupation*, between 2008 and 2018, the largest employment growth in the county is anticipated to occur in the Educational and Health Services field with a 23% change and an addition of 4,110 new jobs. Other sectors that will see growth by 2018 are Professional and Business Services with a 16% increase with an addition of 2,780 jobs and Leisure and Hospitality, also with a 16% increase and an addition of 2,290 new jobs. The Government sector overall plans to add 560 new jobs; the local government will see the largest increase with 540 new jobs and the federal government will drop 5% losing about 70 jobs.⁴⁰ Considering these projected industry growths are relatively reflective of the highest revenue generating industries in Clackamas County, as of 2007, all of the above mentioned concerns should be incorporated in future hazard mitigation planning.

LABOR AND COMMUTE SHED

Most hazards can happen at any time during the day or night. It may be possible to give advance warning to residents and first responders who can take immediate preparedness and protection measures, but the variability of hazards is one part of why they can have such varied impact. A snow storm during the work day will have different impacts than one that comes during the night. During the day, a hazard has the potential to segregate the population by age or type of employment (e.g., school children at school, office workers in downtown areas). This may complicate some aspects of initial response such as transportation or the identification of wounded or missing. Conversely, a hazard at midnight may occur when most people are asleep and unable to receive an advance warning through typical communication channels. The following labor shed and commute shed analysis is intended to document where county residents work and where people who work in Clackamas County reside.

Below, Table 2.28 shows where workers commute to, who reside in Clackamas County. While the county employs the most of its residents with 36.8% working in Clackamas and also living here, it makes sense that given the close proximity to Portland, OR, 31.2% of Clackamas County residents work there. It is also important to note that very few residents commute so far. The top three counties that residents commute to, aside from the one they live in, surround the borders of the county.

⁴⁰ Oregon Employment Department, *Employment Projections by Industry and Occupation 2008-201*, Pg. 333. Accessed 3 January 2011. <http://info.org/pubs/projections/projections.pdf>.

Table 2.28: Commute Shed (Where Workers are Employed who Live in Clackamas County), 2009

Location	Count	Percent
Clackamas County	59,557	36.8%
Oregon City	8,459	5.2%
Lake Oswego	6,008	3.7%
Milwaukie	5,236	3.2%
Wilsonville	4,911	3.0%
Multnomah County	57,896	35.8%
Portland	50,434	31.2%
Gresham	5,910	3.7%
Washington County	25,018	15.5%
Beaverton	6,298	3.9%
Tigard	5,779	3.6%
Tualatin*	4,586	2.8%
Hillsboro	3,264	2.0%
Marion County	6,707	4.1%
Clark County, WA	2,014	1.2%
Lane County	1,550	1.0%
Yamhill County	1,198	0.7%
Deschutes County	735	0.5%
King County, WA	698	0.4%
Linn County	605	0.4%
All Other Locations	5,798	3.6%
Total All Jobs	161,776	100%

Source: US Census Bureau, OnTheMap, Work.

Likewise, Table 2.29 show where workers live who work in Clackamas County. Again, the results are similar as 41.9% of the people who work in Clackamas County live here. The locations outside of Clackamas County where the highest number of workers come from are neighboring Multnomah and Washington counties. There seems to be a large percent of those employed in Clackamas County living in nearby Portland, while a majority of workers who reside within Clackamas County lines live in either Oregon City or Lake Oswego.

Table 2.29: Labor Shed (Where Workers Live who are Employed in Clackamas County), 2009

Location	Count	Percent
Clackamas County	59,557	41.9%
Oregon City	5,893	4.1%
Lake Oswego	4,408	3.1%
West Linn	4,079	2.9%
Milwaukie	3,600	2.5%
Canby	2,893	2.0%
Multnomah County	33,977	23.9%
Portland	26,411	18.6%
Gresham	5,434	3.8%
Washington County	198,649	13.8%
Beaverton	3,930	2.8%
Marion County	7,163	5.0%
Clark County, WA	5,443	3.8%
Yamhill County	2,292	1.6%
Lane County	1,934	1.4%
Linn County	1,127	0.8%
Deschutes County	1,097	0.8%
Columbia County	1,081	0.8%
All Other Locations	8,833	6.2%
Total All Jobs	142,153	100%

Source: US Census Bureau, OnTheMap, Home.

Synthesis

Regional economic capacity refers to the present financial resources and revenue generated in the community to achieve a higher quality of life. Forms of economic capital include income equality, housing affordability, economic diversifications, employment, and industry. The current and anticipated financial conditions of a community are strong determinants of community resilience, as a strong and diverse economic base increases the ability of individuals, families, and the county to absorb disaster impacts for a quick recovery.

With an above average income equality, Clackamas County has a greater median household income than the state and Nation, as well as an unemployment rate of 10.1% which is lower than both the state and the Nation. And although the county is ranked number 1 as having the most diverse economy throughout all of Oregon, more Clackamas County residents are paying greater than 35% of their income on housing, than the Nation as a whole.

While two industries, Information and Education and Health Sciences, saw significant increases in employment from 2005 to 2010, all of the other sectors saw dramatic declines or limited growth. Thus, relying heavily on its top two revenue-producing industries, manufacturing and retail, it is important for the county to consider the economic impacts

that affect its residents in the event of a disaster. Strategies and actions to reduce vulnerability from an economic focus are imperative and should focus on risk management for the county's dominant industries.

Built Capacity

Housing Building Stock

When it comes to hazard mitigation planning it is important to consider housing characteristics as the character of the housing stock affects the level of risk that communities face from natural hazards. Table 2.30 identifies the type of housing most common throughout Clackamas County. It is evident that a majority of the housing stock are single units, as 71.8% of the total housing units are single units. It is important to keep this in mind as hazard mitigation efforts throughout the County should provide outreach and information that highly address preparedness in single housing units.⁴¹ It should also be noted that the percentage of Mobile Homes throughout the county is at 6.8%. While this is a low number compared to the single housing units, mobile homes tend to be more at risk by the affects of disasters as moveable structures are likely to shift on their foundations and create hazardous conditions for occupants.⁴²

Table 2.30: Housing Types, 2010

Housing Type	Number of Units	Percentage of Total Housing Types
1 Unit	112,761	71.8%
2 to 9 Units	15,543	9.9%
10 to 19 Units	7,432	4.7%
20 or More Units	10,400	6.6%
Mobile Home	10,664	6.8%
Boat, RV, Van, Etc.	286	0.2%
Total Housing Units	157,086	100%

Source: US Census Bureau, 2010 American Community Survey, 1-year Estimates, B25024

The single-family housing trend has remained constant over the years and continues with construction permits for new, privately-owned residential building permits. Table 2.31 describes that although the number of permits have drastically decreased since 2005 by almost 75%, the number of permits requested just for single family homes have remained steady with an average of 98% for both 2005 and 2010. This shows that while new construction has significantly decreased, the amount of permits for single family homes has remained at the number one request for building permits.

⁴¹ State of Oregon Natural Hazards Mitigation Plan, Region 2 Northern Willamette Valley/Portland Metro Regional Profile.

⁴² Ibid.

Table 2.31: Annual Privately-Owned Residential Building Permits, 2005 and 2010

	2005		2010	
	Buildings	Units	Buildings	Units
Single Family	2,430	2,430	607	607
Two Family	2	4	16	32
Three or Four Family	0	0	1	3
Five or More Family	20	226	1	5
Total	2,452	2,660	625	647
Percent Change of Permits between 2005 and 2010	-	-	-74.50%	-75.70%

Source: US Census Bureau, Annual Building Permits, Reported Only.
<http://censtats.census.gov/bldg/bldgprmt.shtml>

The age of a structure is also important to consider as the older the home is, the greater the risk of damage they face from natural disasters. This is because structures built after the late 1960s in the Northwest and California began using earthquake resistant designs and construction techniques for better resiliency, and so the older the home is the less resilient the structure may be. In addition, FEMA began assisting communities with floodplain mapping during the 1970s, and communities developed ordinances that required homes in the floodplain to be elevated to one foot over Base Flood Elevation (BFE). Knowing the age of a structure is helpful in targeting outreach regarding retrofitting and insurance for owners of older structures.⁴³

As you can see in Table 2.32, about half of the housing in Clackamas County, 49.6%, has been built after the 1960s and 1970s when stricter building codes were enforced, while there is only about 17.4% of the housing stock that was built before the 1960s.⁴⁴ Residents in structures built before the 1960s face a higher risk of damage because of less stringent building codes and seismic stability. Although the percentage of homes built before the 1960s is low, it is still important to reach out to these residents for better preparedness and mitigation efforts.

⁴³ State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

⁴⁴ US Census Bureau, 2010 American Community Survey 1-year Estimates, B25034.

Table 2.32: Housing Stock by Age, 2010

Year Structure was Built	Number	Percent of Housing
Built 2005 or later	10,398	6.6%
Built 2000 to 2004	11,755	7.5%
Built 1990 to 1999	32,646	20.8%
Built 1980-1989	23,058	14.7%
Built 1970-1979	34,106	21.7%
Built 1960 to 1969	17,762	11.3%
Built 1950 to 1959	9,457	6.0%
Built 1940 to 1949	6,468	4.1%
Built 1939 or earlier	11,436	7.3%
Total Housing Units	157,086	100%

Source: US Census Bureau, 2010 American Community Survey, 1-year Estimates, B25034.

Mitigation and preparedness planning should also consider the type of occupancy when developing and distributing outreach and educational materials. Residents who own their own home are more likely to be more involved, prepared, and willing to take the extra steps needed to reduce the impact of natural hazards through mitigation and insurance methods, while residents who rent may only be focused on the preparedness and insurance methods as opposed to physical improvements to the structure. Below, Table 2.33 shows that only about 31% of the units in Clackamas County are renter-occupied.

Table 2.33: Housing Unit Occupancy Summary, 2010

Type of Unit	Number	Percent of Housing
Occupied Housing Units	145,790	92.9%
<i>Owner-Occupied</i>	100,982	69.3%
<i>Renter-Occupied</i>	44,808	30.7%
Vacant Housing Units	11,155	7.1%
Total Housing Units	156,945	100%

Source: US Census Bureau, 2010 General Housing Characteristics, QT-H1.

Physical Infrastructure

Physical infrastructure such as dams, roads, bridges, railways, and airports support Clackamas County communities and economies. Critical facilities are those facilities that are vital in government response and recovery activities and are important to consider as there can be serious secondary impacts to such facilities when disrupted. Critical facilities and infrastructure can be a wide range of things depending on the social, environmental, economic, and physical makeup of the area under consideration. Such facilities can include emergency services, communication services, transportation systems, government facilities, healthcare and public health facilities, information technology, water services, and energy generation and transmission. Due to the fundamental role that infrastructure plays both pre- and post-disaster, special attention in the context of creating more resilient

communities is important.⁴⁵ The information provided in this section will outline important infrastructures throughout the county which will help provide a basis for informed decisions about how to reduce the county's infrastructural vulnerabilities to natural hazards.

DAMS

While Dam failures can occur at any time and are quite common, the potential for severe damage still exists. The Oregon Water Resources Department inventoried all dams located throughout Oregon. There are a total of 71 dams located throughout Clackamas County. Table 2.34 displays the Dam Threat Potential, and shows that only 6 are considered a High Threat. Of these six dams, only 1, Willamette Falls, hasn't been inspected in the past 3 years. It is important to note that Willamette Falls was last inspected in 1993.⁴⁶

Table 2.34: Clackamas County Dam Inventory

Number of Dams	Dam Threat Potential
6	High
44	Low
21	Significant

Source: Oregon Water Resources Department, Dam Inventory Query.
http://apps.wrd.state.or.us/apps/misc/dam_inventory

RAILROADS

Railroads are major providers of regional and national cargo and trade flows. Railroads run through the Northern Willamette region provide vital transportation links from the Pacific to the rest of the country. The Portland & Western (PNWR), the Union Pacific Railroad (UP), and the Oregon Pacific (OPR) are the three major railroads that run through Clackamas County. All three travel through the western portion of the county moving along north to south.⁴⁷

Rails are sensitive to icing from the winter storms that can occur in the Northern Willamette region. For industries in the region that utilize rail transport, these disruptions in service can result in economic losses. The potential for rail accidents caused by natural hazards can also have serious implications for the local communities if hazardous materials are involved.⁴⁸

AIRPORTS

Clackamas County has no commercial service airports, however Portland International Airport (PDX) which is the busiest airport in the state is located in neighboring Multnomah County. Clackamas County has 24 private airports and 4 heliports. Two heliports service

⁴⁵ State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

⁴⁶ Oregon Water Resources Department, Dam Inventory Query for Clackamas County. Accessed 29 December 2011. http://apps.wrd.state.or.us/apps/misc/dam_inventory/default.aspx.

⁴⁷ Oregon Department of Transportation, State Rail Maps. Accessed 29 December 2011. http://www.oregon.gov/ODOT/RAIL/docs/Maps_Drawings/OR_Railroad.pdf.

⁴⁸ State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

hospitals, Providence Willamette Falls Medical Center and Meridian Park Hospital. Flights face potential for closure from a number of natural hazards that are common in Clackamas County, including windstorms and winter storms.⁴⁹

ROADS AND BRIDGES

Clackamas County is responsible for over 1,436 miles of roads and 158 bridges in its 1,868 square mile territory.⁵⁰ The county's major expressway is Interstate 205. It runs North/South through Clackamas County and is one of the main passages for automobiles, buses, and trucks traveling through the state up to Washington via I-5 or along the Columbia via I-84. Other highways that service Clackamas County include:

- Interstate 5: runs north to South along the western portion of the county through Wilsonville eventually branching out to create Interstate 205.
- US Route 26: connects major Clackamas County cities, such as Sandy, to Portland via the Mount Hood Scenic Byway
- Oregon Route 211: runs south and west from Portland out to Sandy when it connects with US Route 26. It also runs concurrently for part of the way with OR 224 in Estacada and Eagle Creek, and intersects with OR 213 in Molalla.
- Oregon Route 212: runs east to west running from Clackamas and connecting the cities of Boring and Damascus.
- Oregon Route 213: connects with cities and other highways in different parts of the county including Molalla and Estacada with the OR 211, Oregon City with Interstate 205, Clackamas, Estacada, Mount Hood, and Johnson City with Oregon Route 212/Oregon Route 224, and Milwaukie and Clackamas with OR 224.
- Oregon Route 224: runs north to south throughout the county through the cities of Milwaukie, Clackamas, Eagle Creek, and Estacada.

Daily transportation infrastructure capacity throughout Clackamas County is stressed by maintenance, congestion, and oversized loads. Natural hazards can further disrupt automobile traffic and create gridlock, and will make evacuations difficult.⁵¹

Bridges are another major form of transportation infrastructure that could interrupt evacuation efforts if they are destroyed during a disaster. The Oregon Department of Transportation (ODOT) released a bridge inventory in which Table 2.35 describes the types of bridges present in Clackamas County. There are a total of 284 bridges located throughout the county that include state, county, and city highway bridges. It is important to be aware of the existing conditions of these bridges as incapacitated bridges can disrupt traffic and exacerbate economic losses because of the inability of industries to transport services and products to clients.⁵²

⁴⁹ Ibid.

⁵⁰ Clackamas County Website, Transportation and Development. Accessed 12 January 2012.
<http://www.clackamas.us/transportation/improvement/>.

⁵¹ State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

⁵² Ibid.

Table 2.35: Clackamas County Bridge Inventory, 2011

Clackamas County	
State Highway Bridges	113
County Highway Bridges	155
City/Municipal Highway Bridges	16
Historical Covered Bridges	0
Total	284

Source: State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

UTILITY LIFELINES

Utility lifelines are the resources that the public relies on daily such as, electricity, fuel and communication lines. If these lines fail or are disrupted, the essential functions of the community can become severely impaired. Utility lifelines are closely related to physical infrastructures, like dams and power plants, as they transmit the power generated from these facilities.

The network of electricity transmission lines running throughout Clackamas County is operated by Portland General Electric.⁵³ With the Williams Gas Pipeline in the Northwest operating approximately 3,900 miles of pipe beginning in northern Washington, making its way down through Portland, Oregon and then ending in the Rogue Valley, most residents in Clackamas County have their natural gas operated by Northwest Natural Gas.⁵⁴ These lines may be vulnerable as infrequent natural hazards, like earthquakes, could disrupt service to natural gas consumers across the region.

CRITICAL FACILITIES

Critical facilities are those facilities that are essential to government response and recovery activities (e.g., polices and fire stations, public hospitals, public schools). It is important that these facilities are the most resilient to natural hazards as interruption or destruction of these facilities could restrict response efforts and time needed to assist those in danger. Below, Table 2.36 identifies the types and numbers the critical facilities located throughout Clackamas County.

⁵³ Allan, Stuart et. al., Atlas of Oregon. Pg. 102.

⁵⁴ Williams, Gas Pipeline, Natural Gas Transportation & Storage. Accessed 3 January 2011.
http://www.williams.com/gas_pipeline/.

Table 2.36: Critical Facilities in Clackamas County

Types of Facilities	County Total
Hospitals (# of beds)	3 (408)
Police Stations	11
Fire & Rescue Stations	17
Dams	71 (6 High Threat)
Bridges	284
<i>State Highway</i>	113
<i>County Highway</i>	155
<i>City Municipal Highway</i>	16
School Districts & Colleges	10 Districts, 1 Community College, 1 University
Airports - General Aviation	4

Source: State of Oregon Natural Hazards Mitigation Plan, Region 2: Northern Willamette Valley/Portland Metro Regional Profile, 2012.

Clackamas County is served by the Clackamas County Sheriff's office, as well as individual city law enforcement teams. The county Sheriff's office provides services to unincorporated parts of the county as well as contracts police services to the incorporated cities of Wilsonville, Estacada, Happy Valley, and Damascus, while the rest of the incorporated cities have their own law enforcement agency that provides services within the city limits.⁵⁵ There are a total of 14 Fire Districts and Departments with over 70 fire stations located throughout the county. Clackamas Fire District #1 is one of the largest fire protection districts in Oregon, serving over 179,000 residents across the region.⁵⁶ Aside from just extinguishing fires, each fire district and department provides essential public services in the communities they serve, including emergency medical services, search and rescue, and fire prevention education.⁵⁷

The county Courthouse is located in Oregon City and primarily houses state and court-related offices, the rest of the county departments are also located in Oregon City in either the Public Services Building or Development Services Building located in what is known as the Red Soils Campus.⁵⁸ The Clackamas County Department of Communications (C-COM) provides 9-1-1 emergency and non-emergency call taking service for all residents throughout the county except for residents within the city limits of Lake Oswego, West Linn and Milwaukie whose 9-1-1 calls are answered by Lake Oswego 9-1-1 (LOCOM). The county's Emergency Management Office is also located within the C-COM building.⁵⁹

DEPENDENT FACILITIES

In addition to the critical facilities mentioned above in Table 2.36, there are other facilities vital to the continued delivery of health services and may significantly impact the public's ability to recover from emergencies. Facilities which have patients that are dependent on

⁵⁵ Clackamas County Website, Clackamas County Sheriff's Office. Accessed 30 December 2011.

<http://www.clackamas.us/sheriff/info.jsp?name=contractcities.htm>.

⁵⁶ Clackamas County Wildfire Protection Plan, Pg. 90.

⁵⁷ Clackamas County Wildfire Protection Plan, Pg. 89.

⁵⁸ Clackamas County Website. Accessed 30 December 2011. <http://www.clackamas.us/about.htm>.

⁵⁹ Clackamas County Website, Clackamas County Communications. Accessed 30 December 2011. <http://clackamas911.org/>.

continued support and care include assisted living centers, nursing homes, residential mental health facilities, and psychiatric hospitals. In the event of a disaster, these facilities may also act as secondary medical facilities as they are equipped with nurses, medical supplies, and beds. Distributed across the county, Clackamas has 27 assisted living facilities, 14 registered nursing homes, 19 residential care facilities, and 1 mental health residential program that will assist those in need.⁶⁰

CORRECTIONAL FACILITIES

Correctional facilities are incorporated into physical infrastructure as they play an important role in everyday society by maintaining safe separation from the public. There are two correctional facilities located in Clackamas County. The Clackamas County Jail and the Clackamas County Juvenile Department are both located in Oregon City. While correctional facilities are built to code to resist structural failure, they typically have backup power to sustain regulation of inmates following the immediate event of an emergency. It is when the impacts of the event continue over a long duration, that logistical planning of these facilities becomes a challenge.

Synthesis

Built capacity refers to the built environment and infrastructure that support a community. The various forms of built capital mentioned above will play significant roles in the event of a disaster. Physical infrastructures, along with utility and transportation lifelines are critical during a disaster and are essential for proper functioning and response. Community resilience is directly affected by the quality and quantity of built capital and lack of, or poor condition of, infrastructure can negatively affect a community's ability to cope, respond, and recover from a natural disaster. Initially following a disaster, communities may experience isolation from surrounding cities and counties due to infrastructure failure. These conditions will force communities to rely on local and immediate resources, so it is important to identify critical infrastructures throughout the county as they may play crucial roles in the mitigation and recovery stages of a disaster.

Although 71% of the housing stock in Clackamas County are single-family units, 13% are comprised of Mobile Homes and Buildings with 20 or more units, which are particularly prone to the effects of natural hazards and disasters. 17.4% of the total housing units throughout the county were also built before building codes enforced a more strict policy for seismic building standards. Similarly, 30.7% of the housing stock is renter-occupied. It is important for the county to consider these numbers when producing mitigation and educational outreach materials as it is important to reach all populations, especially the ones who face a higher risk of damage. There are 6 dams throughout the county classified with a high threat potential. With the county so large, there are a variety of critical facilities located throughout county limits that in the event of a disaster can make communication efforts challenging. Several major highways run throughout the county, giving residents a number of alternative routes that may provide service access, or serve as evacuation routes, yet if these roads are destroyed it can isolate communities and make rescue efforts more challenging.

⁶⁰ Clackamas County Website. Clackamas County Social Services Resource Guide.
<http://www.clackamas.us/socialservices/rguide/>.

Community Connectivity Capacity

Social Organizations

Social systems have the ability to easily reach vulnerable populations, which have a tendency to be more at-risk in the event of a disaster. Social systems can be community organizations and programs that provide social and community-based services for the public. It would be beneficial for the county to work with such programs to help distribute information that will help educate those who do not have the resources to learn about hazard mitigation. These services are predominantly located in urbanized areas of the county, which is synonymous with the general urbanizing trend of local residents.

Below are a few methods that social organizations located throughout Clackamas County can use to become involved in hazard mitigation.

- Education and Outreach – Organizations can partner with the community to educate the public or provide outreach assistance and materials on natural hazard preparedness and mitigation.
- Information Dissemination – Organizations can partner with the community to provide and distribute hazard-related information to target audiences.
- Plan/Project Implementation – Organizations may have plans and/or policies that may be used to implement mitigation activities or the organization can serve as the coordinating or partner organization to implement mitigation actions.

Civic Engagement

Civic engagement and involvement are important indicators of community connectivity. Whether it is engagement through outlets such as volunteerism or through local, state, and national politics, you can gauge the connection people have to their community by the more they are willing to help out.

For residents who want to become involved in their community through volunteering can join the county's program, Volunteer Connection. Through this program, residents can search online through a database of a variety of volunteer opportunities throughout the county and choose one that fits their schedule. This program, among many others, allows residents to give back to their community.

Those who are more invested in their community may also have a higher tendency to vote in political elections. Below, Table 2.37 outlines voter participation and turnout percentages from the 2008 Presidential General Election compared to the 2010 State Representative General Election. The 2008 Presidential General Election resulted in an 85.2% voter turnout in the county, while the 2010 State Representative General Election only resulted in a turnout of about 73.91% voter participation.⁶¹ These results are synonymous with voter participation reported across the state.⁶²

⁶¹ Clackamas County Website, Election Results. Accessed 15 December 2011.
<http://www.clackamas.us/elections/results.jsp>.

⁶² Oregon Blue Book. Accessed 15 December 2011.
<http://bluebook.state.or.us/state/elections/elections04.htm>.

Table 2.37: Election Results, 2008 and 2010

Jurisdiction	2008 Presidential		2010 State	
	Clackamas*	Oregon^	Clackamas*	Oregon^
Total - Registered Voters	227,308	2,153,914	214,198	2,068,798
Total - Ballots Cast	193,688	1,845,251	158,315	1,487,210
Voter Turnout Percentage	85.21%	85.70%	73.91%	71.90%

Source*: Clackamas County Election Results

Source^: Oregon Blue Book Election Results

Cultural Resources

Cultural resources provide residents with a sense of belonging and provide a glimpse into the past to teach current residents about the histories and lives of past residents. Historic sites, museums, and libraries are just a few resources that give residents and visitors a sense of cultural connectivity to a place. These resources celebrate history and help define an area that people call *home*.

Historic Places

The National Register of Historic Places lists all types of facilities and infrastructure that help define a community. Whether it is first schoolhouse in town or even just the home of a resident who played a vital role in the success of the community, the *Register* lists all types of historic features that characterize the area. Table 2.38 categorizes the 83 different National Historic Sites located throughout Clackamas County by their distinction and function.

These places provide current residents, youth, and visitors with a sense of community. Because of the history behind these sites, and their role in defining a community, it is important to protect these *historic sites* from the impacts natural disasters might have on them.

Table 2.38: List of National Register of Historic Sites in Clackamas County

Type of Structure	# of Structures
Bridges and Locks	2
Cabins, Estates, Farms, Houses, Huts, Lodges, Log Cabins	60
Mills	2
Ranger and Guard Stations	3
Roads	3
Churches	4
Schools	1
Historic Districts	2
Miscellaneous Buildings	6
Total	83

Source: National Register of Historic Places. <http://nrhp.focus.nps.gov/natregadvancedsearch.do>

Libraries and Museums

Libraries and Museums are other facilities which a community will use to stay connected. Clackamas County has a Library District in which all but one city, Johnson City, is a

participant.⁶³ The purpose of *The District* is to provide residents with one single library computer system which make it easy for residents to borrow materials from any or all of the libraries throughout the county. Residents can even request to have materials delivered via library courier to their neighborhood library for easy pick-up.⁶⁴ Below, Table 2.39 lists the libraries in the county by type, either public or academically operated.

Table 2.39: List of Libraries in Clackamas County

Type of Library	# of Libraries
Public - Run by individual cities	11
Public - Run by the county	2
Academic - Run by local colleges	3
Total	16

Source: Oregon State Library, Library Directory.
http://libdir.osl.state.or.us/index.php?sort=county&search_string=&search_filter=#C

Because all but one city within the county operates a public library, these facilities should be considered a common place for the community to gather during a disaster, as well as and serve a critical function in maintaining a sense of community.

Museums can also function in maintaining a sense of community as they provide residents and visitors with the opportunity to explore the past and develop cultural capacity. Throughout Clackamas County there are a number of museums that provide information on topics that range from historical, technology, science, and art. As a preservation of history, it is important to also consider museums in the mitigation process for community resilience, as these structures should be protected in critical times, especially disasters.

Community Stability

RESIDENTIAL GEOGRAPHIC STABILITY

Geographic stability is often a result of feeling connected to one's community and a measure of one's rootedness. A person's place attachment refers to this sense of community and can often ones efforts to help revitalize a community.⁶⁵ When looking at the percentage of regional residential stability one can determine that the higher the number of residents who have stayed in a geographic location, the more likely they are to have a place attachment. Regional residential stability is important to consider in the mitigation process as those who have been here awhile are more likely to have a vested interest in the area and should be more willing to help with hazard mitigation efforts. Table 2.40 estimates residential stability across the region. It is calculated by the number of people who have lived in the same house and those who have moved within the same county area a year ago, compared to the percentage of people who have not. Clackamas County is estimated to

⁶³ Clackamas County Website, Library District. Accessed 6 December 2011.

<http://www.clackamas.us/librarydistrict/>.

⁶⁴ Libraries in Clackamas County. Accessed 6 December 2011.

<http://www.lincc.org/uhtbin/cgisirsi/?ps=sonPjuH8pE/NT/199190208/1/520/X#>.

⁶⁵ Susan Cutter, Christopher Burton, and Christopher Emrich, "Disaster Resilience Indicators for Benchmarking Baseline Conditions," *Journal of Homeland Security and Emergency Management* 7, no. 1 (2010): 9.

have 93.3% of its residents live in the same house or have moved within the county in the past year. The figures of community stability are relatively consistent across the region and state.

Table 2.40: Regional Residential Stability, 2010

County	Geographic Stability
Clackamas	93.3%
Multnomah	91.0%
Washington	93.5%
Oregon	93.0%

Source: US Census Bureau, 2010 American Community Survey, 1-year Estimates, *Geographical Mobility in the Past Year*, B07003.

HOMEOWNERSHIP

Another measure of community stability and place attachment is homeownership. One does not seek to be a homeowner in a place they don't feel safe and secure. Residents who become homeowners search for a place in which they are happy, protected, and something they can afford. Homeownership is an indicator that residents will return to a community post-disaster, as these people are economically and socially invested in the community. Likewise, homeowners are more likely to take necessary precautions in protecting their property. Table 2.41 identifies homeownership across the region, the remaining households are renters. With 69.3% of the resident's home owners, Clackamas County has a significantly higher percentage of homeownership compared to all of its surrounding counties, and the state. This high percentage can likely be attributed to affordability, location, and place attachment to the region.

Table 2.41: Regional Homeownership, 2010

County	Home Owners
Clackamas	69.6%
Multnomah	54.3%
Washington	61.8%
Oregon	62.5%

Source: US Census Bureau, US Census Bureau, 2010 Demographic Data, DP-1.

Synthesis

Community connectivity capacity places a strong emphasis on social structure, trust and norms, as well as cultural resources within a community. In terms of community resilience, these emerging elements of social and cultural capital will be drawn upon to stabilize the recovery of the community. Social and cultural capitals are present in all communities; however, it is dramatically different from one town to the next as they reflect the specific needs and composition of the community residents. A community with low residential stability may hinder the full potential social and cultural resources, adversely affecting the community's coping and response mechanisms.

Place attachment can be determined through a variety of outlets. Clackamas County has a wide range of resources that vary from social organizations, civic engagement, and cultural capital that help support findings to suggest residents are well connected with a sense of community and regional stability. From high voter turnout percentage to higher than normal

percentages of regional stability and regional homeownership, residents of Clackamas County are staying put and getting involved. This means that the county needs to invest time informing and supporting its residents to build more resilient and better prepared communities, as they are more likely to return in the event of a disaster. Likewise, it is important to consider the roles such services and facilities can, and will, provide to residents during a disaster event.

Political Capital

Government Structure

Clackamas County is governed by a five member Board of Commissioners. The Commissioners are elected to four-year terms and serve as the governing body which directs the general administration of county government. The county encompasses all or part of 15 cities, and four county urban renewal districts which include Clackamas Industrial Area, Clackamas Town Center, Government Camp and the North Clackamas Revitalization Area.⁶⁶ The Commissioners set policies, enact ordinances, and establish and manage budgets to perform the services that state law and citizens of the county requires.⁶⁷

Beyond the valuable function of Emergency Management, all departments within the county governance structure have some degree of responsibility in building overall community resilience. Each department plays a critical role in ensuring that county functions and normal operations resume after an incident, and that the needs of the population are met.

Some divisions and departments of Clackamas County government that have a role in hazard mitigation are:

- **Department of Emergency Management:** Develops, coordinates and implements a comprehensive all-hazards countywide program to minimize the impact of incidents or disasters which can potentially threaten the safety and welfare of citizens. Aside from being the first county in the country to have a FEMA-approved hazard mitigation plan, the Emergency Management Department also oversees emergency operations, damage assessment, disaster exercises, training, public education and outreach, a city liaison program, and is an active participant in the Portland Urban Area Security Initiative (UASI).⁶⁸
- **Department of Transportation and Development:** Among other things, the DTD is responsible for a broad range of county services involving land use planning and permitting, building permits, county code enforcement, sustainability, and road construction and maintenance.

⁶⁶ Clackamas County Website, About Clackamas County. Accessed 8 December 2011.
<http://clackamas.us/about.htm>.

⁶⁷ Clackamas County Website, Board of County Commissioners. Accessed 8 December 2011.
<http://clackamas.us/bcc/>.

⁶⁸ Clackamas County Website. Department of Emergency Management. Accessed 8 December 2011.
<http://www.clackamas.us/emergency/about.html>.

- **Building Codes:** Can collaborate to do outreach with owners of structures that were not built up to modern, resilient code. Professionals from this department could even be called on to help survey buildings after an incident.
- **Planning and Zoning:** Conducts both short and long range plans that determine much of the built, physical community. Through the county Comprehensive Plan and subsequent polices, this department guides decisions about growth, development, and conservation of natural resources. The Planning Department can be partners in mitigation by developing, implementing, and monitoring polices such as ensuring homes, businesses, and other buildings are built to current seismic code and out of the flood zones.
- **Transportation Maintenance:** Is responsible for maintaining the integrity and safety of over 1407 miles of county roads, 175 bridges, 1400 miles of road striping, 2398 miles of rock shoulder, 26,453 road signs and operates the Canby Ferry for more than 85,000 vehicles a year.⁶⁹ As transportation and infrastructure is a critical component of mobility, this department should be considered in hazard mitigation principles to ensure that residents and safety personnel are able to safely move about in the event of a disaster.
- **Department of Health, Housing and Human Services:** The mission of the Health, Housing and Human Services Department is to promote and assist individuals, families and communities to be safe, healthy and thrive.⁷⁰
 - **Commission for Children and Families:** Plans, advocates, and engages the community around issues on behalf of families and children, often thought of as vulnerable populations due to increased sensitivity to the impacts of hazard incidents. Because this department is in frequent contact with a vulnerable population, it would be a natural partner in mitigation actions for outreach efforts and to build the county's awareness of the needs of children and families.
 - **Public Health:** Provides community-wide health promotion and disease prevention services to assure the physical and mental well-being of county residents.⁷¹ As an inherently mitigation focused department, Public Health can be an ally in preparing the community for natural hazards. Public Health likely has a distribution network established for information and supplies and these connection to the community will be to encourage personal preparedness and also during incident response.
- **Technology Services:** focuses on providing high quality, innovative, cost-effective technology for citizens, county departments, and county commissioners to conduct daily business.⁷² Without this critical component, the county could not effectively serve the

⁶⁹ Clackamas County Website. Roads and Bridges. Accessed 8 December 2011.

<http://www.clackamas.us/roads/>.

⁷⁰ Clackamas County Website. Department of Health, Housing and Human Services. Accessed 8 December 2011.

<http://www.clackamas.us/dhs/>.

⁷¹ Clackamas County Website. Community Health. Accessed 8 December 2011.

http://www.clackamas.us/community_health/ph/.

⁷² Clackamas County Website. Technology Services. Accessed 8 December 2011.

<http://www.clackamas.us/ts/>.

residents. Mitigation efforts from this department would not likely involve citizens at all, but would go a long way to ensuring uninterrupted services during hazard incidents.

- **Geographic Information Systems:** Develops and maintains a Geographic Information System (GIS) for Clackamas County and has the ability to assist in the decision making process by providing an additional tool to analyze and compare numerous geographic data layers along with traditional databases.⁷³ The GIS is composed of computer maps and associated databases. Examples of the maps include soils, flood hazard areas, and streams. In all phases of the disaster cycle, information is key. Building robust data that catalogues not only the county's risk and vulnerability, but also resources and response capability can ensure that efficient and effective mitigation activities.
- **Sheriff's Office:** The mission of the Clackamas County Sheriff's Office is to provide a number of services such as patrol, investigation, civil process corrections services and jail operations in a professional, ethical, and fiscally responsible manner. Life safety is the first goal of mitigation and response. Public Safety interacts with the vulnerable aspects of the community on a day-to-day basis and can help identify areas for focused mitigation.⁷⁴

Existing Plans and Policies

The Clackamas County Natural Hazards Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the county's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the existing plans and policies within the county. Linking existing plans and policies to the Natural Hazards Mitigation Plan helps identify what resources already exist that can be used to implement action items identified in the Plan.

Implementing the action items detailed in the natural hazards mitigation plan through existing plans and policies will increase their likelihood of widespread support and updates, as well as maximizes the county's resources.

The following is a list of plans and policies already in place in Clackamas County:

- Clackamas County Comprehensive Plan
- Clackamas County Community Wildfire Protection Plan
- Clackamas County Transportation System Plan
- Clackamas County Emergency Operations Plan
- Mt. Hood Coordination Plan
- Housing and Community Development Plan
- Capital Improvement Plan
- Clackamas County Strategic Plan

⁷³ Clackamas County Website. Geographic Information Systems. Accessed 8 December 2011.
<http://www.clackamas.us/gis/>.

⁷⁴ Clackamas County Website. Strategic Plan. Accessed 8 December 2011.
<http://www.clackamas.us/docs/bcc/strategicplan.pdf>.

Synthesis

Recognized as the government and planning structures established within the community, Political Capital is an essential component of hazard resilience. Allowing the county to collaborate with several different county departments as well as outside entities makes the hazard mitigation plan more diverse. Because the Plan is composed with input from government and non-government parties, it seeks to ensure that all parties that might be involved in a disaster have a way to become more resilient. It is important that the Plan reaches out to as many entities as possible as disasters have no boundaries and can affect everyone and anyone. Being aware of hazard mitigation ahead of time will allow all parties to prepare and become more resilient.

Clackamas County works with several departments to include them during the Hazard Mitigation planning process which allows the plan to be diverse and include input from a variety of entities. Likewise, other planning documents and policies throughout the county refer to the Hazard Mitigation Plan as there is some overlap and balance in how the county deals with mitigation-related issues.

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