Section IV-E Drought

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Part IV-E Drought

A. OVERVIEW

Drought is a gradual phenomenon. Normally, one dry year does not constitute a drought in California, but rather serves as a reminder of the need to plan for droughts. California’s extensive system of water supply infrastructure (reservoirs, groundwater basins and aqueducts, etc.) generally mitigates the effects of short-term dry periods for most water users.

Drought can have secondary impacts. For example, drought is a major determinant of wildfire hazards, in that it creates greater propensity for fire starts and larger, more prolonged conflagrations fueled by excessively dry vegetation, along with reduced water supply for firefighting purposes. Drought is also an economic hazard. Significant economic impacts on California’s agriculture industry can occur as a result of short- and long-term drought conditions. These include hardships to farmers, farm workers, packers and shippers of agricultural products. In some cases, droughts can also cause significant increases in food prices to consumers due to shortages. Drought can also result in lack of water and subsequent feed available to grazing livestock, potentially leading to risk of livestock death and resulting in losses to the state’s agricultural economy.

Past experience with California droughts tells us that drought impacts are felt first by those most dependent on or affected by annual rainfall – agencies fighting forest fires, ranchers engaged in dryland grazing, farmers and rural residents. Droughts and floods can occur back to back in California, a state with such extremes that Northern California may receive 90 inches of rain in a year and Death Valley only two inches. The 1861-62 great floods were followed by two severely dry years, which ended the cattle rancho economy in California changing the state’s future.

CALIFORNIA DROUGHT HISTORY

California’s is currently (2015) in a category “Exceptional” which is the worst level possible. Drought has affected virtually every county in California at one time or another, causing more than $2.6 million in damages. Droughts exceeding three years are relative rare in Northern California, the source of much of the state’s water supply. The 1929-1934 drought established the criteria commonly used in designing storage capacity and yield for large Northern California reservoirs. The driest single year in California's
measured hydrologic history is 1977.

Prior to the current drought, a major drought occurred in 2007-2009. At a regional level, parts of Southern California experienced a series of consecutive dry years in the late 1990s/early 2000s, with water year 2002 setting records for the single driest precipitation year in cities such as Los Angeles and San Diego. The Colorado River Basin, an important source of water supply for Southern California, experienced five consecutive years of drought in water years 2000-2004.

The 1975-1977 Drought
From November 1975 through November 1977, California experienced one of its most severe droughts. Although people in many areas of the state are accustomed to very little precipitation during the growing season (April to October), they expect it in the winter. In 1976 and 1977, the winters brought only one-half and one-third of normal precipitation, respectively.

The 1987-1992 Drought
From 1987 to 1992, California again experienced a serious drought due to low precipitation and run-off levels. The hardest-hit region was the central coast, roughly from San Jose to Ventura. For the central coast and central Sierra Nevada, 1987 to 1990 was the driest period on record. In 1988, 45 California counties experienced water shortages that adversely affected about 30 percent of the state’s population, much of the dry-farmed agriculture, and over 40 percent of the irrigated agriculture. Fish and wildlife resources suffered, recreational use of lakes and rivers decreased, forestry losses and fires increased, and hydroelectric power production decreased.

In February 1991, Department of Water Resources and Cal OES surveyed drought conditions in all 58 California counties and found five main problems:

1. Extremely dry rangeland
2. Irrigated agriculture with severe surface water shortages and falling groundwater levels
3. Widespread rural areas where individual and community supplies were going dry
4. Urban area water rationing at 25 to 50 percent of normal usage
5. Environmental impacts

After four drought years and three winter months of meager precipitation, California’s water prospects looked bleak at the start of 1991. Storage in major reservoirs had dropped to 54 percent of average, the lowest since 1977, a record dry year. Other supply systems were suffering more major shortages. The shortages led to stringent water rationing and severe cutbacks in agricultural production, including threats to survival of permanent crops such as trees and vines. Fish and wildlife resources were in critical shape as well. Not since the 1928-1934 drought had there been such a prolonged dry period. Water was so scarce that some suppliers doubted the State Water Project (SWP) and the Central Valley Project (CVP) would be able to provide minimum carryover storage as a hedge against yet another dry year. In February 1991, the Governor established the Drought Action Team. This team almost immediately created an emergency drought water bank to develop a supply for four critical needs:

1. Municipal and industrial uses
2. Agricultural uses
3. Protection of fish and wildlife
4. Carryover storage for 1992
The large-scale transfer program, which involved over 800,000 acre-feet of water, was implemented in less than 100 days with the help and commitment of the entire water community and established important links between state agencies, local water interests, and local governments for future programs (Department of Water Resources, “Preparing for California’s Next Drought – Changes Since 1987-92”).

### TABLE 1: CALIFORNIA DROUGHT INCIDENTS 1972 - 2009

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Incidents</th>
<th>Jurisdictions Affected (Counties, Unless Otherwise Noted)</th>
<th>Crop Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>1</td>
<td>Glenn, San Benito, Santa Clara</td>
<td>$8 million</td>
</tr>
<tr>
<td>1988</td>
<td>1</td>
<td>Madera County location emergency was ratified every two weeks through 1991.</td>
<td>N/A</td>
</tr>
<tr>
<td>1990</td>
<td>2</td>
<td>Santa Barbara (City and County)</td>
<td>0</td>
</tr>
<tr>
<td>2001</td>
<td>5</td>
<td>Del Norte, Modoc, Siskiyou, Inyo, Humboldt, Kern, Los Angeles, Ventura, Mono, Lassen, Plumas, San Bernardino, Santa Barbara, Sierra, Shasta, Trinity</td>
<td>N/A</td>
</tr>
<tr>
<td>2002</td>
<td>3</td>
<td>Alpine, Amador, Calaveras, Imperial, Modoc, Nevada, Orange, Placer, Riverside, San Bernardino, Sierra, Stanislaus</td>
<td>$12,100</td>
</tr>
<tr>
<td>2007</td>
<td>1</td>
<td>Kings, Riverside</td>
<td>(data pending)</td>
</tr>
<tr>
<td>2008</td>
<td>1</td>
<td>Fresno, Kern, Kings, Madera, Merced, Sacramento, San Joaquin, Stanislaus, Tulare</td>
<td>(data pending)</td>
</tr>
<tr>
<td>2009</td>
<td>1</td>
<td>Fresno</td>
<td>(data pending)</td>
</tr>
</tbody>
</table>

Sources: Cal OES individual Assistance Section, 2001 & 2002 SBA Declarations/USDA Designations database; Cal OES Origins and Development- A Chronology 1917-1999

Orange County has only been impacted by one of the many droughts between the years of 1972 – 2009.
CLIMATE CHANGE/CLIMATE ADAPTATION AND DROUGHT

Climate scientists studying California find that drought conditions are likely to become more frequent and persistent over the 21st century due to climate change. The experiences of California during recent years underscore the need to examine more closely the state’s water shortage, distribution management conservation and use policies.
The Climate Adaptation Strategy (CAS) stresses the need for public policy development addressing long-term climate change impacts on water supplies. The CAS notes that climate change is likely to significantly diminish California’s future water supply, stating that:

“California must change its water management and uses because climate change will likely create greater competition for limited water supplies needed by the environment, agriculture and the cities.” (State of California Multi-Hazard Mitigation Plan, 2013)

CURRENT STATE DROUGHT HAZARD MITIGATION EFFORTS

Mitigation of drought impacts includes short- and long-term water conservation measures for urban areas as called for by the past Governor's Emergency Proclamations. There is ample literature on urban water conservation measures. Agricultural water conservation measures reducing crop damage and losses include but are not limited to:

- Drought Planning
- Water Management Planning
- Land Management Planning
- Crop Management Planning

CALIFORNIA DROUGHT VULNERABILITY

Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response unlike droughts which are gradual phenomenon. Droughts occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends.

Drought is a complex issue involving many factors—it occurs when a normal amount of moisture is not available to satisfy an area’s usual water-consuming activities. Drought can often be defined regionally based on its effects:

- **Meteorological** drought is usually defined by a period of below average water supply.
- **Agricultural** drought occurs when there is an inadequate water supply to meet the needs of the state’s crops and other agricultural operations such as livestock.
- **Hydrological** drought is defined as deficiencies in surface and subsurface water supplies. It is generally measured as streamflow, snowpack, and as lake, reservoir, and groundwater levels.
- **Socioeconomic** drought occurs when a drought impacts health, well-being, and quality of life, or when a drought starts to have an adverse economic impact on a region.
CALIFORNIA’S CURRENT DROUGHT

The following article sums up the current 2015 drought which is the longest California drought in over a century. It is entitled, 17 Interesting Facts About the California Drought, written by Seametrics, Technology with a Mission on April 20, 2015:

On April 1st, California governor Jerry Brown made an executive order that requires cities and towns to cut 25% of water use (excluding agriculture) to save an estimated 1.5 million acre feet of water over the next nine months. The following facts sum up the current California drought:

**Figure 3: U.S. Drought Monitor for California, October 2015**

1. The drought currently encompasses over 98% of the state of California.

2. More than 44% of California is in “exceptional” drought, the worst level of drought.

3. Some parts of the Sierra Mountains that typically have 66 inches of snow pack are barren.

4. Farmers could sell their water for $700 an acre foot, more than they would earn by using the water to grow crops.

5. Nearly 60 percent of the state’s water needs are now met by groundwater, up from 40 percent in years when normal amounts of rain and snow fall.

6. The drought forced California farmers to fallow 500,000 acres of land in 2014. And the number may double by the end of 2015.

7. California-based trade organization Western Growers Association estimated 17,000 farm jobs were lost in 2014 alone.

8. California is the world’s fifth-largest supplier of food.

9. California grows 43 percent of the nation’s fruits, nuts, and vegetables and more than 90 percent of its almonds, grapes, and broccoli.

10. The current drought cost the (farming) sector an estimated $2.2 billion in 2014.

11. In some areas of the Central Valley, the land is sinking by one foot or more per year.
12. The Sierra Nevada snowpack, which is counted on to provide 30 percent of the state’s water supply as it melts through early summer, is at its second-lowest level on record.

13. The diminished hydropower capacity of California’s dams cost electricity customers a total of $1.4 billion in the past three years.

14. It will take about 11 trillion gallons of water (42 cubic kilometers) — around 1.5 times the maximum volume of the largest U.S. reservoir — to recover from California’s continuing drought, according to a new analysis of NASA satellite data.

15. California’s current drought is the driest period in the state’s 163 years of recorded rainfall history.

16. NASA scientists predict that there is an 80 percent chance of a mega-drought in the Southwest United States before the end of the century.

17. Rows of almond trees cover nearly 1 million acres in California and consume 1.07 trillion gallons of water annually in the state, one-fifth more than California families use indoors.

The California Department of Water Resources (DWR) says the following about drought:

One dry year does not normally constitute a drought in California. California’s extensive system of water supply infrastructure—its reservoirs, groundwater basins, and inter-regional conveyance facilities—mitigates the effect of short-term dry periods for most water users. Defining when a drought begins is a function of drought impacts to water users. Hydrologic conditions constituting a drought for water users in one location may not constitute a drought for water users elsewhere, or for water users having a different water supply. Individual water suppliers may use criteria such as rainfall/runoff, amount of water in storage, or expected supply from a water wholesaler to define their water supply conditions.

The drought issue in California is further compounded by water-rights. Water is a commodity possessed under a variety of legal doctrines. The prioritization of water rights between farming and federally protected fish habitats in California is part of this issue.

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in the planning area are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. Also, during a drought, allocations go down, which results in reduced water availability. Voluntary conservation measures are typically implemented during extended droughts. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.
Key factors that have an effect on water demands in Orange County have influenced water demands in the past and will continue to do so in the future:

**Climate Variability**
California’s climate is highly variable both spatially (from temperate rain forest conditions on the North Coast to the extreme aridity of Death Valley) and temporally. Records for maximum annual precipitation range from more than 90 inches on the North Coast to a little over 2 inches in Death Valley. Droughts and floods can occur in close proximity. For example, the flooding of 1986 was followed by six years of drought (1987-92). At the beginning of the state's historical record the so-called "Noachian" floods of winter 1861-62 were followed by two severely dry years, a combination became the death knell for much of the cattle rancho economy.

**Historical Droughts**
Measurements of California water conditions cover only a small slice of the past. Widespread collection of rainfall and streamflow information began around the turn of the 20th century. During our period of recorded hydrology, the most significant statewide droughts occurred during 1928-34, 1976-77, 1987-92, and 2007-09. The last significant regional drought occurred in parts of Southern California in 1999-2002. And now with the drought of 2014-15 brings a new look at how California agencies and individuals can become more involved in drought mitigation and water conservation.

**Drought and Precipitation**
Most of California's precipitation (rain and snow) comes from storms moving across the Pacific Ocean. The path followed by the storms is determined by the position of an atmospheric high pressure belt that normally shifts southward during the winter months, allowing low pressure zones to move into the state. On average, 75 percent of California's annual precipitation occurs from November through March, with 50 percent occurring from December through February. California's average precipitation is dependent on a relatively small number of storms; a few storms more or less during the winter season can determine if the year will be wet or dry. If a persistent Pacific high pressure zone remains over California in mid-winter, there is a tendency for the year to be dry.

**Drought and Groundwater**
In an average year, about 30 percent of California's urban and agricultural water supplies come from groundwater. Reliance on groundwater increases during droughts due to reduced availability of surface water. During the six-year 1987-92 drought the total number of well driller reports filed with the Department were in the range of 25,000 wells per year for several years, up from fewer than 15,000 reports per year prior to the drought. Most of the new wells were for private residential use.

**Demographic**
Since water use is related to demographics, an accurate description of population and housing stock in the service area can serve as a basis for water planning activities described in the Urban Water Management Plan. California’s extreme population growth over the years has placed a tremendous burden on water providers to serve their growing populations especially as the Colorado River provides less and less water to California.
Economic
In the early 1990’s, the rate of economic growth declined due to the severity and duration of the recession. The recession affected declines in the manufacturing sector, particularly in the defense and aerospace. During the late 1990’s and early 2000’s, the economy was strong and had an effect on increased water usage. However, even with the stronger economy, industrial demands decreased. This has been partly due to changes in operation such as installation of on-site recycled water system. In addition, several large companies have moved out of the area and have been replaced with different sectors whose water usage is lower.

B. PAST OCCURRENCES

Historically, California has experienced multiple severe droughts. According to the State DWR, droughts exceeding three years are relatively rare in Northern California, the source of much of the state’s developed water supply. The 1929-34 drought established the criteria commonly used in designing storage capacity and yield of large Northern California reservoirs. The driest single year of California’s measured hydrologic record was 1977. The figure below depicts California’s multi-year historical dry periods, 1850-2000.

**Figure 4: Southern California’s Multi-Year Historical Dry Periods, 1850 - 2000**

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850</td>
<td>1863-64</td>
<td>1878-79</td>
<td>1898-99</td>
</tr>
<tr>
<td>1900</td>
<td>1912-13</td>
<td>1915-16</td>
<td>1922-24</td>
</tr>
<tr>
<td>1929-34</td>
<td>1947-50</td>
<td>1959-61</td>
<td>1976-77</td>
</tr>
<tr>
<td>1979-82</td>
<td>1987-92</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: California Department of Water Resources (DWR), www.water.ca.gov/*

*Note: Dry periods prior to 1900 estimated from limited data; covers dry periods of statewide or major regional extent*

The HMPC identified the following droughts as having significant impacts on the planning area:

1947-1950—This drought was in effect for the entire State from 1947-49. The most extreme drought areas were in the south, affecting Orange County.

1959-1961—This drought was in effect for the entire State from 1959-1962. The most extreme drought conditions existed in the Sierra Nevada and central coast.

1976-77—A federal disaster declaration was declared as a result of a drought affecting Orange County and much of California. This was the driest two years in California history.

1987-1992—Orange County also suffered adverse effects resulting from this statewide drought.
2007-2009—Water year 2007 was unusually dry across much of California. Water year 2006-2007 ended with 53 percent of normal runoff for the State. Winter snow levels in 2007-2008 were about 65 percent of average. Compounding the drought situation was the spring of 2008, which was the driest spring on record for the state. Water year 2007-2008 ended with 60 percent of normal runoff for the State. January of 2009 was the 8th driest January on record for the state and snow sensors indicated water content in the Sierra statewide snowpack at 60 percent of average.

Who is responsible for Drought?

Federal
According to communications with Brian A. Fuchs, Associate Geoscientist/Climatologist, National Drought Mitigation Center University of Nebraska-Lincoln, “The National Drought Mitigation Center has worked in the drought area for the last 20 years and has long been the “got to” source for monitoring, planning, and mitigation related to drought. About 7 years ago, there was an effort to determine a federal lead agency which would combine the drought efforts of many federal agencies who had some interest or past record in dealing with drought. This effort was the National Integrated Drought Information System (NIDIS) and can be found at drought.gov. The National Drought Mitigation Center and NIDIS works closely addressing many issues/topics related to drought. The federal government has long delegated drought response to the states and many states have implemented drought response plans.”

Currently there seems to exist only an ad-hoc response approach to drought unlike other disasters (e.g., hurricanes, floods, and tornadoes) which are under the purview of FEMA. Some confusion still exists.

State of California
In California, the State National Resources Agency has appointed its Department of Water Resources as the lead for both flood and drought.

C. ORANGE COUNTY DROUGHT

Drought in its simplest definition is an extremely dry climatic period where the available water falls below a statistical average for a particular region. Drought is also defined by factors other than rainfall, including: vegetation conditions, agricultural productivity, soil moisture, water levels in reservoirs and stream flow. In effect, there are essentially three forms of drought: meteorological drought, agricultural drought, and hydrologic drought. A meteorological drought is typically defined when there is a prolonged period of less than average precipitation. An agricultural drought occurs when there is insufficient moisture for an average crop yield. Agricultural drought can be caused by the overuse of groundwater, poor management of cultivated fields, as well as lack of precipitation. Hydrologic drought occurs when the water level in aquifers, lakes or above ground storage reservoirs fall below sustainable levels. A significant percentage of water in Southern California is imported from other regions (Colorado River and Northern California) via aqueducts. Correspondingly drought in California can be made worse by water availability conditions in the regions at which the water originates.
Orange County relies on two major water supply sources, which includes imported water from the Metropolitan Water District (MWD) and local groundwater from the Orange County Water District (OCWD). Approximately 75 percent of the water supply is provided by 11 groundwater wells. The groundwater comes from a natural underground reservoir that stretches from the Prado Dam and fans across the northwestern portion of Orange County, excluding the communities of Brea and La Habra, and extending as far south as the El Toro “Y.”

The RSCCD has no method of controlling service area water demands, the Cities of Santa Ana, Orange and Tustin have control over the water used by the district. These cities are fully dependent on MWDOC, the Municipal Water District of Southern California (MWDSC) and OCWD for water supply. Fortunately, these agencies have always provided adequate, reliable water supplies to serve the District’s needs. The MWDOC, MWDSC and OCWD and the cities of Santa Ana, Orange and Tustin project that the water supply will be adequate to meet essential water demands for the next 20 years. Of course a deepening and continuing drought and/or extensive population increases could impact those projections. Also continuing conservation measures such as hardware installation, the reduction of industrial consumption, and education programs have significantly assisted the reduction in water usage within the County and these and additional mitigation measures are necessary to provide a continued sufficient water supply to the RSCDD.

**Orange County Drought History**
A significant drought, reported by many of the ranchers in Southern California, occurred in 1860. The great drought of the 1930s, coined the "Dust Bowl," was geographically centered in the Great Plains yet ultimately affected water shortages in California. The drought conditions in the plains resulted in a large influx of people to the west coast. Approximately 350,000 people from Arkansas and Oklahoma immigrated to the Great Valley of California. As more people moved into California, including Orange County, increases in intensive agriculture led to overuse of the Santa Ana River watershed and groundwater resulting in regional water shortages. Several bills have been introduced into Congress in an effort to mitigate the effects of drought. In 1998, President Clinton signed into law the National Drought Policy Act, which called for the development of a national drought policy or framework that integrates actions and responsibilities among all levels of government. In addition it established the National Drought Policy Commission to provide advice and recommendations on the creation of an integrated federal policy. The most recent bill introduced into Congress was the National Drought Preparedness Act of 2003, which established a comprehensive national drought policy and statutorily authorized a lead federal agency for drought assistance. It established a National Drought Council within the Department of Agriculture, to improve national drought preparedness, mitigation, and response efforts, and for other purposes.

**Vulnerability Assessment**
Drought produces a complex web of impacts that spans many sectors of the economy and reaches well beyond the area experiencing physical drought. This complexity exists because water is integral to our ability to produce goods and provide services.

Impacts are commonly referred to as direct or indirect. Reduced crop, rangeland, and forest productivity; increased fire hazard; reduced water levels; increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat are a few examples of direct impacts.
consequences of these impacts illustrate indirect impacts. For example, a reduction in crop, rangeland, and forest productivity may result in reduced income for farmers and agribusiness, increased prices for food and timber, unemployment, reduced tax revenues because of reduced expenditures, increased crime, foreclosures on bank loans to farmers and businesses, migration, and disaster relief programs. Direct or primary impacts are usually biophysical. Conceptually speaking, the more removed the impact from the cause, the more complex the link to the cause. In fact, the web of impacts becomes so diffuse that it is very difficult to come up with financial estimates of damages. The impacts of drought can be categorized as economic, environmental, or social.

Many economic impacts occur in agriculture and related sectors, including forestry and fisheries, because of the reliance of these sectors on surface and subsurface water supplies. In addition to obvious losses in yields in both crop and livestock production, drought is associated with increases in insect infestations, plant disease, and wind erosion. Droughts also bring increased problems with insects and diseases to forests and reduce growth. The incidence of forest and range fires increases substantially during extended droughts, which in turn places both human and wildlife populations at higher levels of risk.

Income loss is another indicator used in assessing the impacts of drought because so many sectors are affected. Reduced income for farmers has a ripple effect. Retailers and others who provide goods and services to farmers face reduced business. This leads to unemployment, increased credit risk for financial institutions, capital shortfalls, and loss of tax revenue for local, state, and federal government. Less discretionary income affects the recreation and tourism industries. Prices for food, energy, and other products increase as supplies are reduced. In some cases, local shortages of certain goods result in the need to import these goods from outside the stricken region. Reduced water supply impairs the navigability of rivers and results in increased transportation costs because products must be transported by rail or truck. Hydropower production may also be curtailed significantly.

Environmental losses are the result of damages to plant and animal species, wildlife habitat, and air and water quality; forest and range fires; degradation of landscape quality; loss of biodiversity; and soil erosion. Some of the effects are short-term and conditions quickly return to normal following the end of the drought. Other environmental effects linger for some time or may even become permanent. Wildlife habitat, for example, may be degraded through the loss of wetlands, lakes, and vegetation. However, many species will eventually recover from this temporary aberration. The degradation of landscape quality, including increased soil erosion, may lead to a more permanent loss of biological productivity of the landscape. Although environmental losses are difficult to quantify, growing public awareness and concern for environmental quality has forced public officials to focus greater attention and resources on these effects.

### Table 2: Orange County Agriculture Values (2009)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal Industry</td>
<td>$246,978</td>
</tr>
<tr>
<td>Field</td>
<td>$875,688</td>
</tr>
<tr>
<td>Nursery</td>
<td>$126,316,686</td>
</tr>
<tr>
<td>Tree Fruit &amp; Berry Crops</td>
<td>$51,062,700</td>
</tr>
<tr>
<td>Vegetables</td>
<td>$13,598,272</td>
</tr>
</tbody>
</table>
Social impacts mainly involve public safety, health, conflicts between water users, reduced quality of life, and inequities in the distribution of impacts and disaster relief. Many of the impacts specified as economic and environmental have social components as well. Population out-migration is a significant problem in many countries, often stimulated by greater availability of food and water elsewhere. Migration is usually to urban areas within the stressed area or to regions outside the drought area; migration may even be to adjacent countries, creating refugee problems. However, when the drought has abated, these persons seldom return home, depriving rural areas of valuable human resources necessary for economic development. For the urban area to which they have immigrated, they place ever-increasing pressure on the social infrastructure, possibly leading to greater poverty and social unrest.

In terms of calculations of the replacement value of the potential loss of structures due to drought, additional analysis could not be made due to data limitations. Hazus does not have drought data. However, it is not thought that drought would seriously impact structures in the district. The table above shows the value of agriculture that is present in Orange County. The loss of agriculture would impact the RSCCD financially by the loss of tax dollars received by the district.

D. RSCCD WATER SOURCES

The RSCCD is dependent on the Cities of Santa Ana, Orange and Tustin for water service who in turn are dependent on the Orange County Water District (OCWD), Metropolitan Water District of Orange County (MWDOC), the Metropolitan Water District of Southern California (MWDSC) and the State Water Project for water supply. California has an extremely sophisticated water supply system.

STATE WATER PROJECT

The California State Water Project (SWP) is a water storage and delivery system of reservoirs, aqueducts, power plants and pumping plants. Its main purpose is to store water and distribute it to 29 urban and agricultural water suppliers in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California. Of the contracted water supply, 70 percent goes to urban users and 30 percent goes to agricultural users.

The Project makes deliveries to two-thirds of California's population. It is maintained and operated by the California Department of Water Resources. The Project is also operated to improve water quality in the Delta, control Feather River flood waters, provide recreation, and enhance fish and wildlife.

Today, the Project includes 34 storage facilities, reservoirs and lakes; 20 pumping plants; 4 pumping-generating plants; 5 hydroelectric power plants; and about 701 miles of open canals and pipelines.

The State Water Project provides supplemental water to approximately 25 million Californians and about 750,000 acres of irrigated farmland.
FIGURE 5: CALIFORNIA STATE WATER PROJECT (SWP) FACILITIES

CALIFORNIA STATE WATER PROJECT

STATE WATER PROJECT (SWP) FACILITIES
- Reservoirs
- Lakes
- CVP Canals and Aqueducts
- SWP Aqueducts
- Local Extensions
- State/Federal Water Project
- CVP Facilities
- State Water Project Facilities
- State/Federal Water Project Facilities

Scale: 1 Mile
0 40 80
0 50 100
Elevation
THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA (MWDSC)

The Metropolitan Water District of Southern California (MWDSC) is the regional wholesaler that delivers water to 26 member public agencies – 14 cities, 11 municipal water districts, one county water authority which in turn provides water to more than 19 million people in Los Angeles, Orange, Riverside, San Bernardino, San Diego and Ventura Counties. Metropolitan is governed by a 37-member board of directors who represents their respective member agencies ensuring each member agency is part of the governance process.

To supply the more than 300 cities and unincorporated areas in Southern California with reliable and safe water, Metropolitan owns and operates an extensive water system including the Colorado River Aqueduct, 16 hydroelectric facilities, nine reservoirs, 819 miles of large-scale pipes and five water treatments plants. Four of these treatment plants are among the 10 largest plants in the world. In fact Metropolitan is the largest distributor of treated drinking water in the U.S. The District imports water from the Feather River in Northern California and the Colorado River to supplement local supplies. It also helps its member agencies develop water recycling,
storage and other local resource programs to provide additional supplies and conservation programs to reduce regional demands and help with the ongoing threat of drought.

Metropolitan currently delivers an average of 1.7 billion gallons of water per day to a 5,200-square mile service area.

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY (MWDOC)

The Municipal Water District of Orange County (MWDOC) is a wholesale water supplier and resource planning agency. Their efforts focus on sound planning and appropriate investments in water supply development, water use efficiency, public information, legislative advocacy, water education, and emergency preparedness. MWDOC’s service area covers all of Orange County, with the exception of the cities of Anaheim, Fullerton, and Santa Ana. They serve Orange County through 28 retail water agencies.

Local water supplies meet nearly half of Orange County’s total water demand. To meet the remaining demand, MWDOC purchases imported water from Northern California and the Colorado River through the Metropolitan Water District of Southern California (Metropolitan). MWDOC delivers this water to its 28 client agencies, which provide retail water services to the public.

MWDOC is governed by a seven-member Board of Directors. Each director is elected by the public to represent a specific portion of Orange County. MWDOC also appoints four representatives to advocate the interests of Orange County on the Metropolitan Board. The MWDOC is the third largest Metropolitan member agency and holds key leadership positions on the Board of Directors that oversee policy development, strategy, and implementation.

ORANGE COUNTY WATER DISTRICT (OCWD)

OCWD was formed in 1933 by a special act of the California State Legislature to protect Orange County’s rights to water in the Santa Ana River. OCWD’s primary responsibility is managing the vast groundwater basin under northern and central Orange County that supplies water to more than 20 cities and water agencies, serving more than 2.3 million Orange County residents. Since 1933, OCWD has replenished and maintained the groundwater basin at safe levels while more than doubling the basin’s annual yield. This important source of water provides local groundwater producers with a reliable supply of high-quality water.

OCWD primarily recharges the basin with water from the Santa Ana River and, to a lesser extent, with imported water purchased from the MWDSC. OCWD currently holds rights to all Santa Ana River flows reaching Prado Dam. Water enters the groundwater basin via settling or percolation ponds in the cities of Anaheim and Orange. Behind Prado Dam (constructed and owned by the U.S. Army Corps of Engineers for flood prevention), OCWD owns 2,400 acres in Riverside County, which the District uses for water conservation, water quality improvement and environmental enhancement.

OCWD monitors the groundwater taken out each year to ensure that the basin is not overdrawn; refills the basin; and carries out an assessment program to pay for operating expenses and the cost of imported replenishment water. The groundwater basin holds millions of acre-feet of water.
(an acre-foot satisfies the needs of two families for one year). The groundwater basin provides more than half of all water used within the District. Protection, safety and enhancement of groundwater are OCWD’s highest priorities. With one of the most sophisticated groundwater protection programs in the country, OCWD uses more than 700 wells providing more than 1,400 sampling points—from which OCWD takes more than 18,000 water samples and conducts more than 350,000 analyses every year. OCWD’s monitoring program looks for more than 330 contaminants—far more than the 122 required by the regulatory agencies.

OCWD is leading the way in purification of wastewater for reuse to provide a reliable, new, drought-proof high quality source of water. The Groundwater Replenishment System, a joint project of OCWD and the Orange County Sanitation District, went on-line in January 2008 and can produce enough near-distilled quality water for 500,000 people.

Additional efforts to increase local water supplies include expanding the capacity of the existing percolation facilities, treating poor quality water to make it useable, studying methods to extend the life of filtration membranes, improving advanced purification technologies, using bacteria to remove contaminants, and studying the quality of Santa Ana River water and other water-related issues. Other OCWD groundwater management and water quality activities focus on expanding the Prado wetlands, groundwater treatment at well heads, computer modeling of the groundwater basin and conservation of endangered or threatened species.

About Groundwater
Groundwater is the high-quality water that makes up more than half of all water used in Orange County. The groundwater basin began forming millions of years ago as mountains eroded and ocean sediments filled a deep valley, trapping Santa Ana River water between the layers of accumulated sand and gravel. The deepest aquifers of the groundwater basin still contain pristine water that fell to the earth thousands of years ago. The water Orange County drinks today may have entered the basin one year, 100 years or 1,000 years ago, depending on the location and depth of the well. The groundwater basin holds between 10 million and 40 million acre-feet of water, of which 1.25 million to 1.5 million acre-feet is usable.

Groundwater has always been vital to the lives and livelihoods of Orange County residents. In the 1800s and early 1900s, Orange County’s growing agricultural industry thrived because of a reliable, easily obtainable supply of water pumped from the ground below. As farmers continued to pump groundwater and divert water from the Santa Ana River for irrigation, they noticed that groundwater levels were falling. Pumps had to be lowered deeper into the ground to pump out the same amount of water, requiring more energy. The question of seawater being drawn into the groundwater basin also was of serious concern.

Orange County’s groundwater basin supplies up to 75% of the water needs for residents and businesses in Anaheim, Buena Park, Costa Mesa, Cypress, Fountain Valley, Fullerton, Garden Grove, Huntington Beach, Newport Beach, Irvine, La Palma, Los Alamitos, Orange, Placentia, Santa Ana, Seal Beach, Stanton, Tustin, Villa Park, Westminster and Yorba Linda. (This includes all RSCCD sites and facilities.)
CITY OF SANTAANA WATER

The City of Santa Ana Public Works Department manages the water service for Santa Ana. It depends on two sources for the 12.5 billion gallons of water supplied to its residents each year, 72 percent is groundwater and 28 percent is imported water, purchased from the MWDSC.

The groundwater accumulates and is stored beneath the surface of the earth and then pumped to the surface by 20 City-owned wells. MWDSC brings Colorado River water from Lake Havasu and runoff from the snow pack in the Sierra Nevada Range in Northern California. The water is then treated at either the Diemer Filtration Plant in Yorba Linda or the Weymouth Filtration Plant in LaVerne before it is delivered to Santa Ana college facilities. There are seven MWDSC connections located in the city. Most of Santa Ana customers receive a blending of the two sources, groundwater and imported water.

CITY OF ORANGE WATER

The City of Orange water supply comes from several sources: local groundwater basins, Northern California water via the State Water Project, the Colorado River, local watersheds, reclamation, and water reuse projects. The City is a member agency of MWDOC and MWDSC. MWDSC supplies imported water to six Southern California counties, including Orange County. As a MWDOC member, it represents the interests of its 29 member agencies at the MWDC.
The City of Orange is also a member of the OCWD who manages the vast groundwater basin under north and central Orange County. The Orange County Groundwater Basin is the main source of water supply for the City of Orange. The City obtains approximately 64 to 75 percent of its water from City-owned wells. The City purchases approximately 25 to 36 percent through the MWDOC. In addition, the City purchases approximately 3 to 5 percent from the Serrano Water District. The following four water districts serve the City of Orange:

- Irvine Ranch Water District
- Golden State Water Company
- Serrano Water District
- East Orange County Water District (EOCWD)

CITY OF TUSTIN WATER

The City of Tustin’s main sources of water supply are: groundwater from the Lower Santa Ana River Groundwater Basin and imported water from Metropolitan through MWDOC. The City relies on 85% groundwater and 15% imported water. It is projected that through 2035 the water supply will remain roughly the same. The City works together with three primary agencies: Metropolitan, MWDOC, and OCWD to insure a safe and high quality water supply. The sources of imported water supplies include the Colorado River and the State Water Project (SWP).

E. WATER EMERGENCIES

The Water Emergency Response Organization of Orange County (WEROC) coordinates and supports an effective emergency response to a major disaster on behalf of all Orange County water and wastewater agencies. To carry out this mission WEROC provides services that promote planning and preparedness activities for both the agencies, as well as its own Emergency Operations Center (EOC) volunteer staff. The program also takes an active role in maintaining two EOCs.

The program is supported by a consortium of Orange County water and wastewater agencies including City of Santa Ana, City of Orange and the City of Tustin.
F. EXISTING RSCCD DROUGHT MITIGATION EFFORTS

The RSCCD has been proactive in the area of sustainability for the past several years. The Board of Trustees has established policies for District sustainability that have been incorporated in both the District Educational and Facilities Master Plans. The District has been active in recycling efforts, encouraging public transit use for students, faculty, and staff, and implementing energy and water saving projects and efficient new construction of campus facilities. Students have also been very active in this area through various clubs and sustainability events. While the District has made significant progress on the path to sustainability, it is poised to accomplish much more with the implementation of the new Sustainability Plan.

Both Santa Ana and Santiago Canyon have implemented water conservation strategies through various projects on their respective campuses. For example, Santiago Canyon College is currently working with the Irvine Ranch Water District (IRWD) to utilize reclaimed water to irrigate the athletic fields. Although the area is served by the IRWD, the recycled water is provided through a partnership from the City of Orange Water Department.

In addition, the new Humanities and Gymnasium buildings at Santiago Canyon College were designed with low-flush volume toilets with automatic operation resulting in reduced water usage. Low-flush urinals were also installed and plans have been made to install more when funding is available. Synthetic turf has also been installed on the softball field to reduce the need for water, fertilizer, and pesticides. Santa Ana College has installed new efficient, low-flow irrigation systems in all of its new perimeter landscaping as well as efficient irrigation valves to reduce its water use on campus. A new tournament quality artificial turf soccer field was recently installed to reduce the use of water, fertilizer, and pesticides, as well as GHG emissions related to lawn mowers. Finally, the District would like to explore the feasibility of greywater systems, which capture and repurpose used water for flushing toilets or irrigation. It will aim to pilot a greywater system at one of the campuses.

Various sustainable landscaping projects have been implemented on both campuses, such as the Campus Landscape Improvement Program at Santa Ana College and the Coastkeeper Garden at Santiago Canyon College (SCC). The Coastkeeper Garden is a project where Santiago Canyon College leases some of its property to the non-profit Orange County Coastkeepers, who have built a demonstration garden open to the public featuring sustainable landscape techniques. SCC has also undergone campus landscaping projects using native or adaptive plant materials to reduce or eliminate irrigation requirements. Highly water efficient irrigation equipment is employed where irrigation is required. Moving forward, the District will continue to landscape with native plants and employ water-wise landscaping practices. The District will explore the installation of water bottle refilling stations or enhance current water fountains to better accommodate bottle refills. This will encourage the use of reusable bottles, thereby reducing the amount of plastic water bottles purchased and thrown in the waste stream.

The Community College Academic Senate Curriculum Committee indicates that faculty members are currently integrating sustainability in the curriculum in three main ways: by adding a component to an existing course outline of record, creating a new course, or creating a new certificate or degree program. The District employs these strategies as described more fully below, and all strategies will require leadership from faculty for adoption.
Some examples of courses include:

**Biology 170/ Environmental Studies 170 – Environmental Challenge of the 21st Century –**
Examines the environmental impacts of increased human population on food, water and energy resources. Land use policies and environmental effects of pollution will also be analyzed.

**Engineering 203 – Sustainable Construction and Facilities Management**
This course provides students the means to apply core sustainable principles to each step within the facilities planning, design and management process. It examines best practices for site and building: energy, conservation, reclamation, recycle-ability, air, water, waste, sound, ecological literacy, and management tools.

**Environmental Studies 140/ Geology 140 – Environmental Geology**
This course focuses on the study of urban geologic hazards: earthquakes, groundwater pollution, flood potential, landslides and creep, soil expansion, coastal erosion, and volcanic hazards. Santiago Canyon College is the lead college for training field water utility employees throughout Orange County. In addition, the Community College Academic Senate Curriculum Committee is adding new certificate and degree programs on sustainability including:

**Water Utility Science Degree & Certificate**
The Water Utility Science program and certificate at Santiago Canyon offers a wide range of courses that directly apply to water distribution, treatment, and wastewater management. The program provides a great opportunity for students to be trained in a growing and important field centered on environmental sustainability. With completion of the program, students are prepared for entry-level jobs in the water distribution, treatment and water reclamation industries. The associate of science degree provides coursework and internship experience designed to provide an overview of a wide range of environmental career opportunities.

According to the Director of District Construction, the sites are independently following through on drought mitigation – albeit using similar approaches: signage, reduced irrigation. Where we have coordinated more closely is through scheduled maintenance. There are projects proposed and approved in the Scheduled Maintenance Program that address irrigation control and replacement of turf with drought tolerant species. Additionally since Santa Ana College is undergoing a significant infrastructure project and hard/soft scape replacement that balances the landscape design in a way that meets water conservation mandates.

The RSCCD has been extremely pro-active on water conservation. One of the projects being studied by the committee for the Santa Ana Community College is the feasibility of a rainwater harvesting system, which would use the upper deck of the parking structure as a collection area.

**SUSTAINABLE RSCCD COMMITTEE (SRC)**

**Purpose**
The Sustainable RSCCD Committee is a participatory governance committee, working with the campus committees, responsible for raising awareness within the district and making recommendations to the Chancellor concerning the conservation of energy and other resources and the implementation of sustainability practices that impact the district and community.

The District has established water conservation goals in their approved RSCCD Sustainability Plan. The District will perform water use benchmarking studies at both campuses and the District
Office to better understand usage as compared to similar facilities and community college peers. Based on the results, the District will establish annual water use reduction goals and plan new appropriate measures to achieve goals.

Responsibilities
Promote and nurture new patterns of thinking about college and district operations, practices, learning programs, support services and the relation to the local community that include consideration of conservation of energy and sustainability.

Develop a comprehensive plan to achieve climate neutrality.

Create institutional structures and identify resources relating to conservation of energy and sustainability to guide and support the implementation of the comprehensive plan.

Complete an inventory of all greenhouse gas emissions and update that inventory at least once every two years.

Encourage the development of curriculum that raises awareness about climate neutrality and sustainability and that offers a career path to employment in "green" technologies.

Review the status of and develop objectives related to improving and maintaining the "green infrastructure" of the district and colleges.

Provide periodic progress reports on the accomplishments of the committee.

Sustainability Plan
The Sustainable RSCCD Committee finalized work on the Rancho Santiago Community College District Sustainability Plan in February 2015. The plan was approved by the Board of Trustees at its meeting of March 9, 2015, Rancho Santiago Community College District Sustainability Plan.

G. LIKELIHOOD OF FUTURE OCCURRENCES

EXTENT/PROBABILITY OF OCCURRENCE AND MAGNITUDE

Of the many varied indexes used to measure drought, the "Palmer Drought Severity Index" (PDSI) is the most commonly used drought index in the United States. Developed by meteorologist Wayne Palmer, the PDSI is used to measure dryness based on recent temperature compared to the amount of precipitation. It utilizes a number range, 0 as normal, drought shown in terms of minus numbers, and wetness shown in positive numbers. The PDSI is most effective at analyzing long-range drought forecasts or predications. Thus, the PDSI is very effective at evaluation trends in the severity and frequency of prolonged periods of drought, and conversely wet weather. The National Oceanic and Atmospheric Administration (NOAA) publish weekly Palmer maps, which are also used by other scientists to analyze the long-term trends associated with global warming and how this has affected drought conditions.

The U.S. Drought Monitor is unique, blending numeric measures of drought and experts' best judgment into a single map every week. It started in 1999 as a federal, state, and academic partnership, growing out of a Western Governors' Association initiative to provide timely and understandable scientific information on water supply and drought for policymakers.

The Monitor is produced by a rotating group of authors from the U.S. Department of Agriculture, the National Oceanic and Atmospheric Administration, and the National Drought Mitigation
Center. It incorporates review from a group of 250 climatologists, extension agents, and others across the nation. Each week the author revises the previous map based on rain, snow and other events, observers’ reports of how drought is affecting crops, wildlife and other indicators. Authors balance conflicting data and reports to come up with a new map every Wednesday afternoon. It is released the following Thursday morning.

Very Likely
The University of Nebraska-Lincoln has published many of the Palmer Drought Index maps analyzing trends over the past one hundred years (National Drought Mitigation Center). In coastal Southern California, (Orange County is a coastal county) from 1895 to 1995, severe droughts occurred 10 to 15 percent of the time. From 1990 to 1995, severe droughts occurred 10 to 20 percent of the time and as recently as 1989, a severe drought was documented that lasted for six years. More recently, between 1999 and 2004, a six-year drought on the Colorado River basin has resulted in a drawdown of Colorado River water storage by more than 50%. The 2014-15 drought has been severe causing the Governor to declare a State of Emergency and require conservation measures of all Californians.

Based on these trends, severe droughts can readily occur in Southern California. According to the California Natural Resources Conservation Service (NRCS), the current and recent droughts in Southern California have caused extensive devastation to forests in the mountains of San Bernardino, San Jacinto and Palomar Mountains. Drought weakens trees which make them susceptible to infestation by bark-beetles. In turn dry vegetation and beetle infested trees are more susceptible to fire than healthy forests.

In addition, droughts are occurring much more often since the 1970’s. With the tremendous population explosion in Southern California and the possibility of Climate Change, based on this data, droughts are Very Likely to continue to impact the planning area.

Drought Impact Types: Short Term droughts are typically less than 6 months with Long Term droughts typically greater than 6 months.

Drought Intensities are listed below. On January 17, 2014, California’s Governor Brown declared a State of Emergency for drought. At the time of this plan, October 2015, California is in level D4, Exceptional Drought emergency.
## H. Mitigation Strategies

### Short Term Mitigation

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Drought Short Term Activity #1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Action Item</strong></td>
<td>Develop a comprehensive approach to mitigating the hazard Drought.</td>
</tr>
<tr>
<td><strong>Coordinating Organization</strong></td>
<td>Risk Manager and Chief District Safety &amp; Security</td>
</tr>
<tr>
<td><strong>Ideas for Implementation</strong></td>
<td>Work through the Sustainable RSCCD Committee (SRC), do the following</td>
</tr>
<tr>
<td></td>
<td>1. Assign a lead individual for the hazard Drought for the District</td>
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<tr>
<td></td>
<td>2. Integrate the Hazard Mitigation Plan with the RSCCD Sustainability Plan</td>
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<tr>
<td></td>
<td>3. Increase Drought awareness and education (Short Term Activity #2)</td>
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<tr>
<td></td>
<td>4. Monitor and report drought conditions (Short Term Activity #3)</td>
</tr>
<tr>
<td></td>
<td>5. Develop a Drought Conservation Plan by RSCCD department and intensity levels D0, D1, D2 and D3 (Short Term Activity #4) with a list of activities that will be followed during each level.</td>
</tr>
<tr>
<td></td>
<td>6. Develop a section of the District’s Emergency Plan on Drought for intensity level D4 or for when the Governor declares a Drought State of Emergency for California (Short Term Activity #5)</td>
</tr>
<tr>
<td><strong>Time Line</strong></td>
<td>5 years</td>
</tr>
<tr>
<td><strong>Constraints</strong></td>
<td>Pending Funding and Available Personnel</td>
</tr>
<tr>
<td><strong>Funding Sources</strong></td>
<td>General Fund</td>
</tr>
<tr>
<td><strong>Cost Estimate</strong></td>
<td>Staff Time</td>
</tr>
<tr>
<td><strong>Benefits: Losses Avoided</strong></td>
<td>Live saving. Low cost item</td>
</tr>
<tr>
<td><strong>Priority</strong></td>
<td>Medium/High</td>
</tr>
<tr>
<td><strong>Plan Goals Addressed</strong></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>Promote Public/College Community Awareness</td>
</tr>
<tr>
<td>X</td>
<td>Create Partnerships and Implementation</td>
</tr>
<tr>
<td></td>
<td>Protect Life and Property</td>
</tr>
<tr>
<td></td>
<td>Protect Natural Systems</td>
</tr>
<tr>
<td>X</td>
<td>Strengthen Emergency Services</td>
</tr>
<tr>
<td>Hazard</td>
<td>Drought Short Term Activity #2</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Action Item</td>
<td>Increase Drought Risk Awareness and Education</td>
</tr>
<tr>
<td>Coordinating Organization</td>
<td>Risk Manager and Chief District Safety &amp; Security</td>
</tr>
</tbody>
</table>

**Ideas for Implementation**

- Present the RSCCD Hazard Mitigation Drought Section to as many RSCCD staff, faculty, students and the public when possible.
- Every occasion the districts emergency preparedness program is presented, include information on the RSCCD Hazard Mitigation Drought Section and ask for input into future projects.
- Present the U.S. Drought Monitor to RSCCD staff, faculty, students and public to ensure they understand that California is in the Exceptional Drought index and how severe the drought situation is in California. Even when the drought ends, drought education must continue.
- Include information on monitoring droughts, conservation actions the district is taking, emergency plans for severe droughts, and educating students, faculty, and staff on water saving techniques for work and home.
- Review the California “Local Government Drought Toolkit” to determine if further District actions are necessary. Go to: http://www.opr.ca.gov/docs/Local_Government_Drought_Toolkit_March_10_2014.pdf

**Time Line**
Ongoing

**Constraints**
Chief District Safety & Security can only offer the training; attendance is voluntary

**Funding Sources**
General Fund

**Cost Estimate**
Staff Time

**Benefits: Losses Avoided**
Sustained mitigation outreach programs have minimal cost and will help build and support district-wide capacity. This type of activity enables the district faculty, students and the public to better prepare for, respond to and recover from disasters.

**Priority**
High

**Plan Goals Addressed**
- X Promote Public and College Community Awareness
- X Create Partnerships and Implementation
- X Protect Life and Property
- Protect Natural Systems
- X Strengthen Emergency Services
### Hazard
Drought Short Term Activity #3

<table>
<thead>
<tr>
<th>Action Item</th>
<th>Monitor and report drought conditions to RSCCD personnel and students to provide early warning for policy makers, planners, as well as facility and maintenance personnel to make decisions through actions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinating Organization</td>
<td>Risk Manager and Chief District Safety &amp; Security</td>
</tr>
</tbody>
</table>
| Ideas for Implementation | 1. Research where to access the best and most updated Drought information including U.S. Drought Monitor, State OES, and the Orange County Operational Area  
2. Monitor these agencies and report California’s drought index to key elected and management personnel along with a list of actions being taken by each department.  
   a. [http://droughtmonitor.unl.edu/](http://droughtmonitor.unl.edu/)  
3. Place this information on the District’s website monthly or as the situation changes.  
4. Develop a Drought Communications Plan. Determine who should be notified and how these communications will take place. |
| Time Line | 5 years |
| Constraints | Pending Funding and Available Personnel |
| Funding Sources | General Fund |
| Cost Estimate | Staff Time |
| Benefits: Losses Avoided | Live saving. Low cost item |
| Priority | Medium/High |
| Plan Goals Addressed | X Promote Public/College Community Awareness  
X Create Partnerships and Implementation  
Protect Life and Property  
Protect Natural Systems  
X Strengthen Emergency Services |
### Hazard
Drought Short Term Activity #4

### Action Item
Develop a Drought Conservation Plan for the RSCCD (Implement Water Conservation Strategies SRC 4.7.2)

### Coordinating Organization
Risk Manager and Chief District Safety & Security

### Ideas for Implementation
- Utilizing the Sustainable RSCCD Committee (SRC), make a complete list of what mitigation and conservation efforts have been completed or are ongoing.
- Using the US Monitor Intensity scale (below), make a list by department on what conservation actions are necessary for intensity levels D0, D1, D2 and D3. List what is expected of those departments and employees during each intensity level.

#### Intensity:
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

### Time Line
5 years

### Constraints
Pending Funding and Available Personnel

### Funding Sources
General Fund

### Cost Estimate
Staff Time

### Benefits: Losses Avoided
Live saving. Low cost item

### Priority
Medium/High

### Plan Goals Addressed
- [X] Promote Public/College Community Awareness
- [X] Create Partnerships and Implementation
  - Protect Life and Property
  - Protect Natural Systems
- [X] Strengthen Emergency Services
### Hazard
Drought Short Term Activity #5

### Action Item
Update the District and Site emergency plans for intensity level D4, Exceptional Drought, which should be considered as a disaster.

### Coordinating Organization
Risk Manager and Chief District Safety & Security

### Ideas for Implementation
- Develop a Drought Section to the Districts Emergency Plan that would be activated when California reaches intensity level D4, Exceptional Drought, or when the Governor Proclaims a Drought State of Emergency. This plan should include a list by department on what actions are necessary when D4 Exceptional Drought level and what is expected of those departments and employees.

- Intensity:
  - D0 Abnormally Dry
  - D1 Moderate Drought
  - D2 Severe Drought
  - D3 Extreme Drought
  - D4 Exceptional Drought

- Decide who will and how those actions will be enforced.

### Time Line
5 years

### Constraints
Pending Funding and Available Personnel

### Funding Sources
General Fund

### Cost Estimate
Staff Time

### Benefits: Losses Avoided
Live saving. Low cost item

### Priority
Medium/High

### Plan Goals Addressed
- X Promote Public/College Community Awareness
- X Create Partnerships and Implementation
  - Protect Life and Property
  - Protect Natural Systems
- X Strengthen Emergency Services
# LONG TERM MITIGATION

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Drought Long-Term Activity #1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action Item</td>
<td>Retrofit Water Supply Systems.</td>
</tr>
<tr>
<td>Coordinating Organization</td>
<td>Director of District Construction</td>
</tr>
<tr>
<td>Ideas for Implementation</td>
<td></td>
</tr>
<tr>
<td>1. Improve water supply and delivery systems to save water through actions such as:</td>
<td></td>
</tr>
<tr>
<td>a. Designing water delivery systems to accommodate drought events</td>
<td></td>
</tr>
<tr>
<td>b. Developing new or upgrading existing water delivery systems to eliminate breaks and leaks</td>
<td></td>
</tr>
<tr>
<td>Time Line</td>
<td>5 years</td>
</tr>
<tr>
<td>Constraints</td>
<td>Pending Funding and Available Personnel</td>
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<tr>
<td>Funding Sources</td>
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<tr>
<td>Priority</td>
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</tr>
<tr>
<td>Plan Goals Addressed</td>
<td>X Promote Public/College Community Awareness</td>
</tr>
<tr>
<td></td>
<td>X Create Partnerships and Implementation</td>
</tr>
<tr>
<td></td>
<td>Protect Life and Property</td>
</tr>
<tr>
<td></td>
<td>Protect Natural Systems</td>
</tr>
<tr>
<td></td>
<td>X Strengthen Emergency Services</td>
</tr>
<tr>
<td>Hazard</td>
<td>Drought Long-Term Activity #2</td>
</tr>
<tr>
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</tr>
<tr>
<td>Action Item</td>
<td>Enhance Landscaping and Design Measures (Adopt Sustainable Landscaping Practices SRC 4.7.4)</td>
</tr>
<tr>
<td>Coordinating Organization</td>
<td>Director of District Construction</td>
</tr>
<tr>
<td>Ideas for Implementation</td>
<td>All future landscaping on the seven RSCCD sites should take into consideration using drought-tolerant landscape design through measures such as:</td>
</tr>
<tr>
<td></td>
<td>a. Incorporating drought tolerant or xeriscape practices into landscape ordinances to reduce dependence on irrigation</td>
</tr>
<tr>
<td></td>
<td>b. Using permeable parking lots and surfaces to reduce runoff and promote groundwater recharge</td>
</tr>
<tr>
<td>Time Line</td>
<td>5 years</td>
</tr>
<tr>
<td>Constraints</td>
<td>Pending Funding and Available Personnel</td>
</tr>
<tr>
<td>Funding Sources</td>
<td>General Fund</td>
</tr>
<tr>
<td>Cost Estimate</td>
<td>Staff Time</td>
</tr>
<tr>
<td>Benefits: Losses Avoided</td>
<td>Live saving. Low cost item</td>
</tr>
<tr>
<td>Priority</td>
<td>Medium/High</td>
</tr>
<tr>
<td>Plan Goals Addressed</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>Promote Public/College Community Awareness</td>
</tr>
<tr>
<td>X</td>
<td>Create Partnerships and Implementation</td>
</tr>
<tr>
<td>X</td>
<td>Protect Life and Property</td>
</tr>
<tr>
<td></td>
<td>Protect Natural Systems</td>
</tr>
<tr>
<td>X</td>
<td>Strengthen Emergency Services</td>
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