

Project Name	Watershed	Source of Project	Bucket	Project Type	Location	Project Description	Targeted Pollutants	Water Quality Data	Tributary Area/ Restoration Footage
Quarry Falls Reclamation/ Mixed Use Development	San Diego River	City of San Diego - Specific Plan	3	Restoration & Redevelopment					
Biofiltration Wetland Creation and Education Program	San Dieguito	County of San Diego - IRWM Grant	1, 2, 3	Education; Demonstration Project; Wetland Treatment	San Diego Wild Animal Park	A demonstration wetland will be developed within the San Diego Wild Animal Park (Park). It will be used to educate visitors about water conservation and the importance of conserving wetlands. The wetlands will improve water quality within the Park through natural biological filtration, enhance wetlands (pond edge habitat) habitat, as well as reduce water consumption.	BOD, TSS, organic nitrogen, nitrates		
Neighborhood Rain Garden		Minnesota / Stormwater Magazine article	1, 2	Education; Demonstration Project		Water-primrose (<i>Ludwigia</i> spp.) is problematic in numerous areas of the San Diego River Basin. Supported by high nutrient loads, <i>Ludwigia</i> grows in dense mats along shoreline and often extends over water surface across river. Excessive growth of water primr	Urban runoff, bacteria, TSS, pesticides	Measurable pollutant load reduction to lake. Runoff reduced by 90%. No adverse effects from snow; garden "dry" within 3-4 hours.	5.3 acres (residential)
Green Streets		UC Davis Article	2	LID		Green streets are those created to mimic the natural hydrology of the land by managing runoff on the surface and at its source. Green streets are considered to be one component of a larger watershed approach for improving water quality, can minimize the quantity of water directly piped to conveyances, maximized use of street tree coverage for stormwater interception and heat-island impact, and at points where green streets cross water features they are designed for the least amount of impact to thier surroundings. Through reducing impervious cover and utilizing biofiltration processes pollutants can be minimized, using the street design as a treatment area. Green street design helps to control the volume and flow-rate of water reducing water quality impacts and soil erosion.	Urban runoff, bacteria		

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Small-farm fertilizing and watering practices education	Regional	County of San Diego - Education/ Outreach Proposed Program	1	Education	Regional (small farms)	68% of San Diego County farms range in size between 1-9 acres; a median size farm is only 4 acres. Because of this, there is a need to educate small-farm owners/farmers in fertilizing and watering practices that protect and enhance water quality, as well as conserve water and save money. This education and outreach program would focus on irrigation practices, appropriate and conservant use of fertilizers and BMPs that can be used on-site to either capture and reuse water or prevent runoff. Using peer mentoring, on-site visits and BMP demonstrations, farmers will also have the opportunity to use their farms as demonstration sites. (Similar to Livestock and Land Program)	Nutrients, pesticides	By educating small-farm farmers in appropriate and conservant water and fertilizer use, as well as BMPs appropriate to their individual farms, a reduction in nutrients and pesticides can be realized.	Collectively, small farms (< 9 acres) make up more than half of the farms in the region.
Water quality treatment for the Special Drainage Area (SDA)-7 Storm Water Quality Master Plan (SWQMP)	San Diego River	County	1	Master Planning	Special Drainage Area (SDA)-7	Project would involve master plan-level identification and placement of treatment control (structural) BMPs. "Treatment control (structural) BMP" is defined as any engineered system designed and constructed to remove pollutants from urban runoff. Example 1 - Hydrodynamic Separator. "BMP-1" is located Northeast of the intersection of Flo Drive and Arnold Way.		Pollutant removal is achieved by simple gravity settling of particulate pollutants, filtration, biological uptake, media adsorption or any other physical, biological, or chemical process.	4,565.4 acres, 76% impervious. (Based on the 85th percentile storm with 0.2 inches/hour intensity, per USUMP - Treatment flow rate of 70.7 cfs; treatment volume of 25.6 acre-feet)
Bacteria Source ID Study, San Diego River	San Diego River	City of San Diego	1	Special Study: Source ID	Three sites: Boundary of City of SD & Santee; Boundary of City of SD & La Mesa; Jurisdictional San Diego	The overall goal was to identify sources of indicator bacteria and other constituents in San Diego River and MS4. This study was composed of two wet weather surveys and one dry weather catchbasin survey. The purpose of the wet weather surveys was to assess the loads in the receiving waters contributed from jurisdictions outside of the City as well as loads at the base of SDR. The purpose of the dry weather component of the study was to assess the effectiveness of standard catchbasin cleaning, together with more advanced cleaning techniques (i.e., vacuum and steam cleaning), to assess cleaning effectiveness on pollutant removal.	Fecal coliforms, TDS, phosphorus, DO, and other pollutants	Wet Weather: Geospatial analysis for bacteria, TDS, nutrients, etc. Positive hit for human-specific Bacteroides. Dry Weather: Impact of catch basin cleaning (by cleaning type) on dry weather loads.	

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Memorial Park Infiltration Basin	San Diego River	City of San Diego	2	LID	Oceanview and 30th St	A storage and infiltration basin will be installed beneath the grassy area of Memorial Park. The runoff from the parking on the west side of the park will be diverted from the storm drain into the new infiltration basin. Before entering the basin, the runoff passes through a hydrodynamic separator that removes pollutants that settle out or float. The infiltration basin is sized to capture and treat a five year storm; any runoff in excess of this size storm will utilize an overflow pipe and return to the normal storm drain system.	Bacteria, pesticides (Diazinon), metals (Cu, Pb, Zn)		1.4 acres
Parcel Characterization Study, Rainbow Creek	Santa Margarita	County	1	Special Study: Source ID	Rainbow Creek Watershed	The purpose of the study was to develop a GIS based threat to water quality (TTWQ) inventory for nutrients for all parcels located within the Rainbow Creek watershed and determine the relative potential of individual parcels and drainage areas to contribute nutrient loading into that watershed. This study was performed as a component in the Implementation Action Plan for the Rainbow Creek TMDL technical report. Although the study will not directly impact water quality, it will lead to characterization of nutrient-generating sources and conveyance systems to guide future BMP implementation.	Nutrients	The study will not directly impact water quality, it will lead to characterization of nutrient-generating sources and conveyance systems to guide future BMP implementation.	
Ruxton Avenue Channel Project	Sweetwater	County	3	Restoration	Spring Valley	Project removes approximately 500 linear feet of trapezoidal concrete channel and corrugated metal pipe culverts. Project replaces channel with natural vegetated channel and tripple box concrete culvert. Water quality treatment through infiltration and natural biofiltration, helping to reduce pollutants from entering downstream receiving waters, conveyance of the 100-year flood event and neighborhood aesthetics. Native low-maintenance vegetation was planted. This was an award winning project.			

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Forester Creek Restoration Project	San Diego River	City of Santee	3	Restoration	1.2 mile segment of creek between Prospect Avenue & Mission Gorge Road (i.e. immediately downstream of the Mission Gorge Bridge).	Project removes 400 feet of concrete channel, widens the channel to accommodate the 100-year flood event flows, and removes trash and invasive species to provide water quality enhancement, flood control and habitat restoration. Creek banks have been planted with coastal sage scrub and southern willow scrub, attracting a variety of bird life, including gnat-catchers, terns, and cliff swallows. The paths and park area have been planted with more than 400 trees, including sycamores, coastal live oaks, and toyons. A trash collector was installed at the El Cajon border where the unlined channel begins to remove refuse before entering the Santee creek area. As native plants oxygenate the water and slower flows decrease turbidity, pollutants such as hydrocarbons, metals, nutrients, and fecal coliform should be removed from the water through natural processes in the wetland. Trash should be removed via the trash collector installed at the El Cajon border.	DO, turbidity, hydrocarbons, metals, nutrients, fecal coliform, trash	<u>Baseline water-quality survey</u> : low DO, high levels of phosphorous and fecal coliform (from sewage, homeless encampments, & wildlife). <u>Post project completion survey</u> : water quality and various biological indicators will be closely monitored for five years.	
El Monte River Valley Recharge Project	San Diego River	Helix Water District	3	Restoration	El Monte Valley (Lakeside)	This project will have four major elements. 1. Surface mining 12 million tons of material over a 10-year period in El Monte Valley on land that is zoned for extractive use. 2. Ground-water recharge of up to 5,000 acre-feet per year 3. Reclamation of the mined lands to be reclaimed to a usable condition for beneficial uses including habitat creation/restoration, a recreational/equestrian trail network, and public access. 4. Restoration which would create additional natural upland and riparian habitat beyond the requirements of the reclamation. Water quality and ancillary benefits including community amenities and augmenting water supply. Water quality benefits will be realized through restoration, invasives removal and natural filtration. IPR also part of this project (augment water supply).			540 acres

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Rainbarrels	Regional	City of San Diego; County of San Diego	2	Source Control/Runoff Reduction	Regional	Use of onsite rainbarrels to capture roof runoff or condensation. Sizing and quantity would depend upon site size and amount of runoff to control. Reduction in flow and associated pollutant load may be realized by retaining water on-site and allowing for re-use for irrigation and thus infiltration. City of San Diego implemented systems at municipal facilities across jurisdiction, including two demonstration systems at Mission Trails Regional Park Nature and Visitor Center in San Diego River Watershed. The County is facilitating a community outreach project, subsidizing a portion of the cost of rainbarrels to county residents.	runoff, metals, other roof pollutants	City of San Diego Rain Barrel / Downspout Disconnect Pilot Study Report	
Break Pad Partnership	Regional		1	Legislative Control		Copper is a major pollutant of concern for stormwater management agencies and has been identified as causing impairment in 79 waterbodies in California. This project provides technical and regulatory information and support for Senate Bill 346 Kehoe, which is intended to phase out the use of copper and other toxic metals in automotive break pads by 2025. At present, Bill 346 has been approved by the Assembly Committee on Environmental Safety and Toxic Materials and has advanced to the Assembly Appropriations Committee.	copper, lead, mercury, asbestos, cadmium, hexavalent chromium		
Cottonwood Creek Park		City of Encinitas	3	Restoration & Treatment	95 N. Vulcan, Encinitas	This park was built on an empty parcel of land in downtown Encinitas used for storage and truck parking for the works department. Cottonwood Creek, a historic creek that allowed for the development of early Encinitas, was located in a 96" pipe underneath the property. In an effort to improve the water quality, the City of Encinitas re-surfaced the creek and built an 8-acre passive recreation park. The creek emerges from underneath Encinitas Boulevard and first flows into a sedimentation pond. This is where all the impurities in the water can settle into the mud of the, once the water leaves the pond it flows for 600 feet over boulders through Willows, Cottonwoods, Sycamores and other native Californian rushes. This process helps aerate the water and clean it further. The natural daylight also gives a chance for the unwanted bacteria, which were very prevalent in the underground creek, to die.		The water quality has been tested at Moonlight Beach since 2002, and there is a notable improvement in 2004 when the park was finished and water began flowing through the resurfaced creek (Heal The Bay).	

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Healthy River Healthy Communities Program	San Diego River	San Diego River Park Foundation	1	Education		Volunteer based program consisting of three core components to address water quality, stormwater pollution and restoration of the San Diego River. Utilizes Google based mapping software to visually convey survey, water quality and clean-up information to the public through the Regional Board's San Diego River Watershed Data Portal and IMRivers. 2,544 volunteers participated in the HRHC program in FY 09-10.			
San Diego River Park Foundation Clean Team and Green Team (River Clean-up Campaign)	San Diego River	San Diego River Park Foundation	1	Source Control: Clean-Ups	Twenty eight miles of the San Diego River.	Volunteer based bi-monthly clean-ups along San Diego River, 23 total events in FY 09-10. Volunteers work to remove trash and debris from the river, restoring habitat and improving water quality. Program engages communities around river by providing an entry point for stewardship and service. Educational resources for reducing stormwater pollution and litter are on hand and available for take home.	trash, debris	In 09-10: 64.62 tons of trash removed. Education & Outreach to 2,204 participants. Removal of hazardous materials such as cars, motor oil and batteries.	
San Diego River Park Foundation RiverWatch Program (Water Quality Monitoring Program)	San Diego River	San Diego River Park Foundation	1	Monitoring	15 stations across River	Volunteer based monthly water monitoring program within urbanized portion of San Diego River and its tributaries, 15 stations total. Volunteers conduct monitoring to detect any pollution or nutrient level changes, and to test the benefits of restoration and clean-up efforts. Results are presented on web based data portal EcoLayers for public and stakeholder review. In 09-10, identified 2 WQO exceedances and 1 illegal discharge which was reported to the appropriate party/jurisdiction.	Nutrients and other pollutants.	Data available on the through the Regional Board's San Diego River Watershed Data Portal.	
San Diego River Park Foundation RiverBlitz (River Surveys)	San Diego River	San Diego River Park Foundation	1	Education	30 miles of San Diego River	Conducted twice annually by trained volunteer teams to document and record trash and dumping sites, target invasive non-native plant species, as well as amenity and aesthetic issues. Identified and reported debris clogging storm drains and fallen storm drain gates to appropriate parties for maintenance and repair. Volunteers use cameras and GPS units to map these locations and collect data to help guide clean-up efforts. (i.e. Data used to guide clean-up efforts and invasive plant removal projects such the Tamarisk removal in Santee's Mast Park floodplain, restoring critical riparian habitat and saving the City significant costs through volunteer labor.)	trash, derbis	-	

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Mapping the Tidal Prism	San Diego River	San Diego River Park Foundation	1	Special Study: Source ID	Mission Valley/ Tidal prism	The extent and impact of tidal push salinity into aquifers and other underground water resources is unknown. This project would install nine sensors to collect continuous salinity data for the aquifers and provide a means to produce a multidimensional map of the tidal influence on underground salinity. Maps would be produced using 2D and 3D models.	Salinity		
Biological Control of Ludwigia	San Diego River	San Diego River Park Foundation	1	Source Control: Clean-Ups	Photos from: DFG Alvarado	Water-primrose (<i>Ludwigia</i> spp.) is problematic in numerous areas of the San Diego River Basin. Supported by high nutrient loads, <i>Ludwigia</i> grows in dense mats along shoreline and often extends over water surface across river. Excessive growth of water primrose can block water flows, reduce oxygen levels, raise water temperatures and damage habitat as well as provide excellent habitat for mosquito larvae. The water primrose flea beetle (<i>Altica litigata</i>) can cause moderate feeding damage; large quantities of these insects may be produced for release in weed-infested area. This is a proposed two year program.	DO, temperature, invasive species	Year 1: Site survey, species verification, <i>Altica</i> population surveys, feasibility study. Year 2: Control program.	
Sediment Control	San Diego River	San Diego River Park Foundation	2	Sediment Control		Both phosphorous, which is the nutrient most often associated with nuisance growths of algae and aquatic plants in lakes and streams, and bacteria are expected to enter the system in association with soil particles. Therefore, control of sedimentation in the watershed would also have positive impacts on these pollutants. Because of the high degree of urbanization, especially in the lower part of the watershed, installation of new detention ponds is probably limited to new urban developments. Vortex separators can be used to improve sediment removal where space is at a premium and can also be retrofitted to existing stormwater systems. Vortex separators typically do not require power and have no moving parts. They usually also incorporate a baffle system to remove floating debris.	Sediments, nutrients (phosphorus), bacteria		
Dredging	San Diego River	San Diego River Park Foundation	2			Dredging projects could result in positive impacts on dissolved oxygen levels in areas where sediments with high organic levels create a high oxygen demand. Permitting and disposal costs increase if the sediment is contaminated and chlordane was mentioned as a possible contaminant of San Diego River sediments.	Sediment, DO, pesticides		

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Enhanced Wetlands	San Diego River	San Diego River Park Foundation	3	Restoration & Treatment		Several side channel or in channel wetlands could be constructed to intercept drainages and stormwater discharges for water quality improvement, control side and main channel erosion during periods of high flow and provide important wildlife habitat and local recreational and educational opportunities. Utilizing natural design will result in extensive cost savings. This project would represent the conceptual design phase of the project, including site survey, data, percolation testing, topography, concept design, preliminary cost estimation.			
Floating Islands	San Diego River	San Diego River Park Foundation	3	Treatment		Specific wetland plants have been documented for their beneficial uses in the removal of specific pollutants such as selenium, iron, manganese, as well as bioremediation. Floating islands can be used where natural or constructed wetlands do not exist or be as versatile as floating islands. This project would represent the conceptual design phase of the project, including surveying of local plant species, water quality, anchoring considerations, access, safety and environmental compliance evaluation.			
Clean Streets Program	Regional		2	Source Control: Street Sweeping		Street sweeping and vacuuming, including signage to alert residents and commercial users of sweeping/vacuuming schedule. This is a visible project - regardless of the comprehension of the relationship between sweeping/vacuuming and clean water, residents understand clean streets. O&M benefit through reduced maintenance (cleaning) to catch basins, stormdrain systems.	trash, debris, metals, and other swept pollutants	City of San Diego Targeted Aggressive Street Sweeping Pilot Study Report	
Westchester Stormwater BMP Design	Southern California: Santa Monica	Geosyntec	3	Treatment	Santa Monica Bay	The BMP is design as a large-scale detention and infiltration system that can treat a significant portion the urbanized watershed (Westchester residential neighborhood & the Los Angeles International Airport airfield at Santa Monica Bay). A long-term hydrologic various storage (detention) volumes, pumping rates, and anticipated infiltration rates to identify the most costsimulation of the watershed was used to iterate between of effective design that meet the design TMDL design goal.	fecal indicator bacteria	Model	2,190 acres

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Cucamonga Creek Watershed Regional Water Quality Project	Southern California: City of Chino (Santa Ana River Basin)	Geosyntec	3	Treatment	Along Mill Creek/ Cucamonga Channel upstream of the Prado Dam	The Project proposes to divert flow from Cucamonga Channel in the vicinity of Hellman Avenue and route it through a series of wetlands/extended detention basins before discharging back to Mill Creek approximately 0.67 mile downstream of the diversion point. The Project will also receive dry weather and low storm flows from a portion of an adjacent development known as The Chino Preserve. The diversion, flow routing between the basins, and discharge back to Mill Creek will be driven by gravity flow.	Wet Weather: nutrients, TSS, bacteria, trash, sediment+. Dry Weather: TDS, nitrogen, bacteria	Model	76.7 sq mi (Treatment volume of 160 ac-ft)
Kimball and Bickmore Natural Treatment System Project	Southern California: Santa Ana River Basin	Geosyntec	3	Treatment	San Bernardino County upstream of the Prado Dam	Two regional treatment facilities: (1) the Kimball Basins, comprised of constructed water quality treatment wetlands integrated into regional multipurpose flood control and stormwater detentions basins; and (2) the Bickmore Basin, comprised of constructed water quality treatment wetlands integrated into stormwater detention basins. These regional facilities are intended to provide treatment of dry and wet weather runoff from existing and future development in "The Preserve", as well as the upstream offsite areas.	Wet Weather: sediments, metals, bacteria, nutrients, oil/grease, pesticides. Dry Weather: oil/grease, pesticides, bacteria, nutrients	Model	Kimball Basin: 1,219 acres. Bickmore Basin: 268 acres
Water Quality Case Study: Santa Ana River	The Prado Basin Area	The Orange County Water District (OCWD)	2,3	Treatment		The water in the Santa Ana River is run through a series of constructed wetland cells in the Prado Basin area. This treatment primarily targets the excessive nitrates from dairy production, as well as non-point source pollution found in recycled water. The Free Water Surface (FWS) wetland process also removes other water quality impairments, but is most effective on nitrate removal. As the constructed wetland systems have matured, they have also been found to provide critical habitat for endangered species such as the Least Bell's Vireo. The second component to treat the water in the Santa Ana River in order to bring the water quality up to drinking water standards, is to divert the river into large infiltration basins further downstream. During dry flow months 100% of the river volume is diverted into these basins for infiltration. The process of infiltration accomplishes cleaning the remainder of the targeted water constituents to bring the water quality up to drinking water standards. A third ben	Urban runoff and associated pollutants, excessive nitrates from dairy production upstream	Model	-