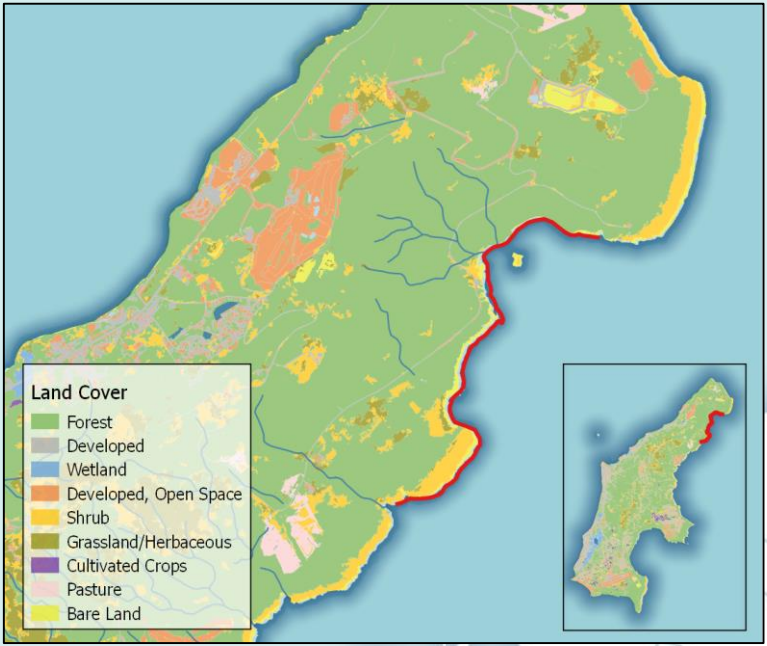
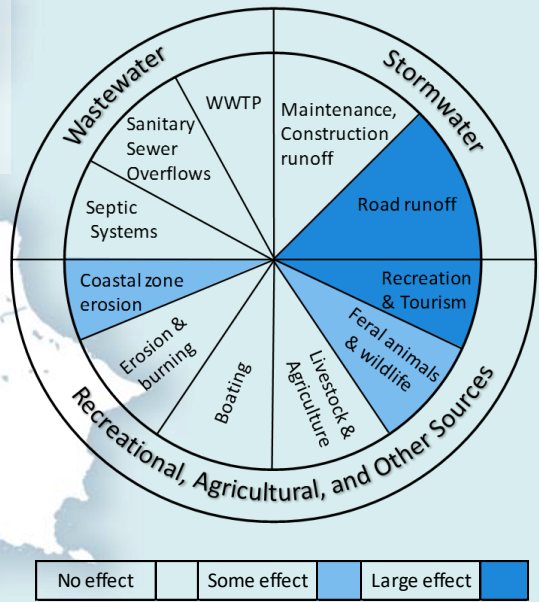


# Segment 12: Kalabera

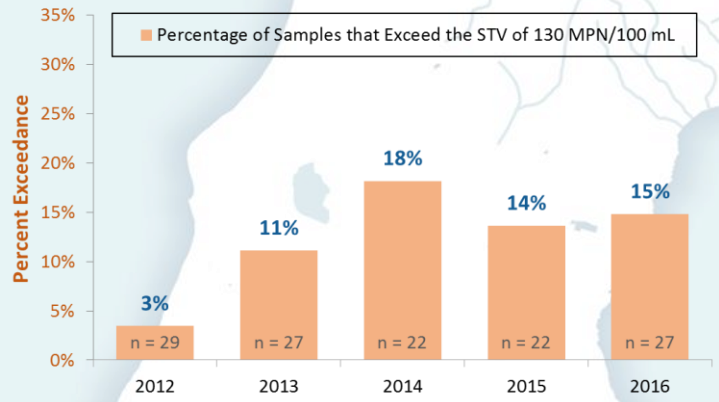


The Kalabera watershed, in NE Saipan, is the least developed watershed on Saipan’s east coast, and is characterized by steep mountains & an upper cliff line that allow for panoramic views. It also contains the isolated Bird Island Sanctuary, that serves as a rookery for nesting seabirds. This watershed receives many tourists who enjoy hiking in the area, and use the roads to get to popular destinations on the island. This segment is included on the Clean Water Act 303(d) list of impaired waters for Enterococcus bacteria, and potential sources include road runoff, recreational & tourist activities, and feral animals.

## Bacteria Sources



## Water Quality Trends



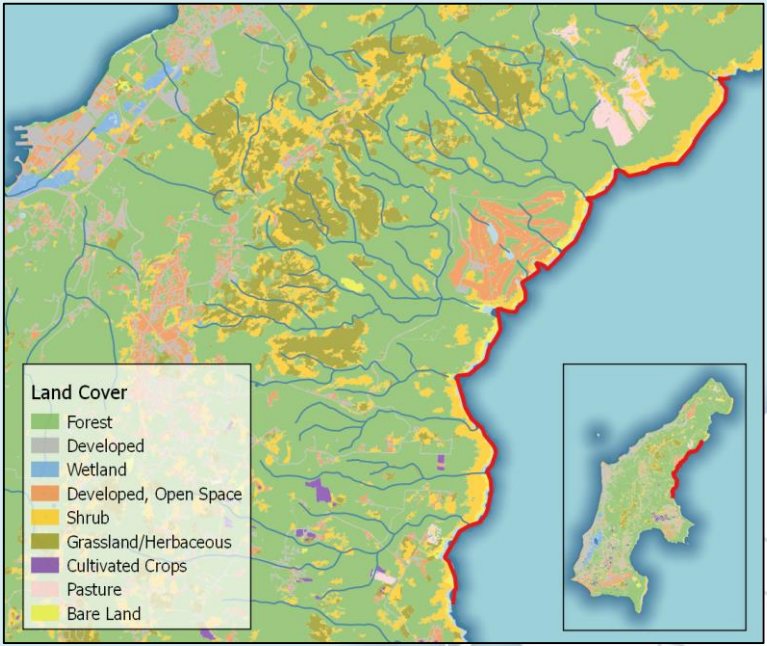
The STV (Statistical Threshold Value) approximates the 90<sup>th</sup> percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

Water quality measurements indicate elevated levels of Enterococcus bacteria, likely from road runoff during rain events, recreation in the watershed, and tourism. Over the past 5 years, no significant changes in water quality trends have been observed: exceedances of water quality standards range from 3 to 18%, with an average exceedance of 12%. Highest exceedances occur during April and September.

## Key Actions

1. Provide serviced restroom facilities for tourists. Manage tourist traffic and limit traffic to areas that contain proper amenities
2. Revegetate the landscape from grass-dominated to forest-dominated species, which would provide more groundwater recharge and accumulate less surface runoff
3. Monitor roads for erosion and reduce sediment derived from roads to waterbodies: pave and grade roads & plant vegetation or install green infrastructure to capture sediment and water during rain events

# Segment 13: Talofofu



Road entry to trailhead at Hidden Beach



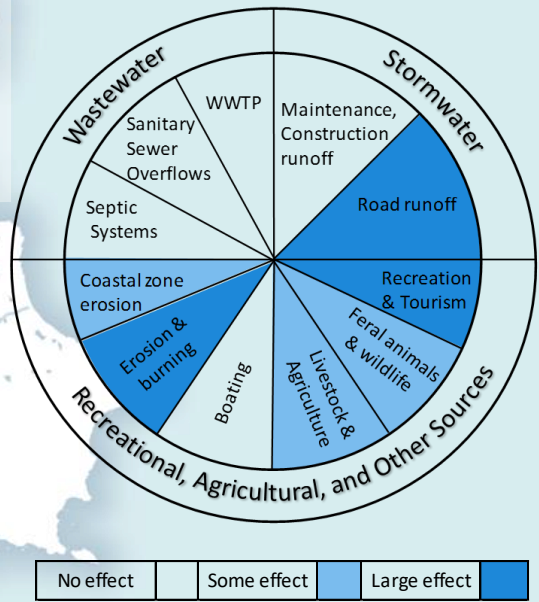
Stream gully



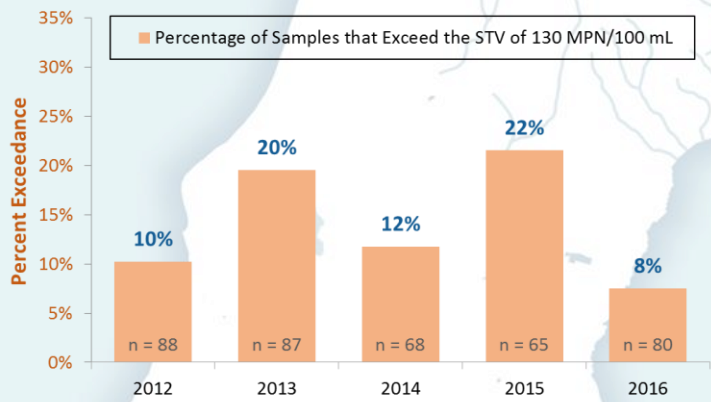
Rubbish dumping along footpaths

The Talofofu watershed has the most surface water flow of all of Saipan's watersheds, and its upper and mid watershed streams that flow almost year round contain large populations of native shrimp and fish species. The coast contains Jeffrey's, Hidden, and The Old Man by the Sea beaches, where tourists visit to experience the remote trails, beaches and coastline. Upland areas contain dispersed houses and small farms, with post-burned lands on exposed hilltops. This segment is included on the Clean Water Act 303(d) list of impaired waters for Enterococcus bacteria, and potential sources include runoff from roads during storm events, erosion, and recreation & tourism.

## Bacteria Sources



## Water Quality Trends



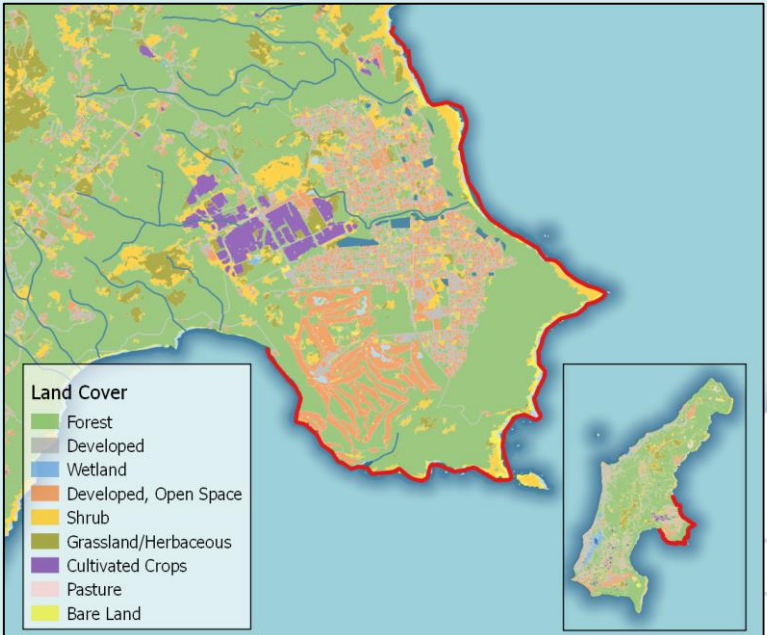
The STV (Statistical Threshold Value) approximates the 90<sup>th</sup> percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

Water quality measurements indicate elevated levels of Enterococcus bacteria, likely from road runoff during rain events, tourism, and erosion, and to a lesser degree livestock, agriculture, and feral animals. Because of the remoteness of the beaches, few to no restroom or garbage facilities are found, which may contribute to elevated levels of bacteria. Over the past 5 years, water quality exceedances were highest in 2013 and 2015, and exceedances ranged from 8 – 22%, with an average of 14%. Highest exceedances occur during the wet season, in August and September.

## Key Actions

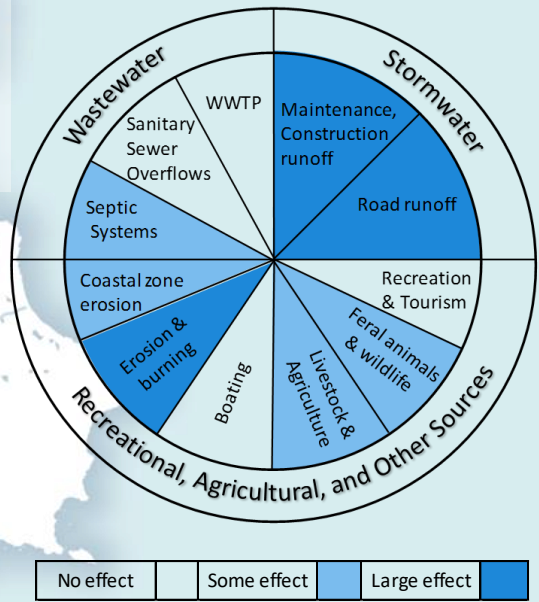
1. Establish garbage collection and adequate restroom facilities with maintenance. Educate visitors with “leave only footprints” campaigns
2. Work with NRCS, and other local groups, to improve wastewater management for livestock facilities in the watershed
3. Decommission unpaved roads and develop parking areas with permeable surfaces
4. Work with ongoing efforts to increase vegetative cover on private lands to minimize erosion & install green infrastructure to slow sediment flow from highly erosive areas

# Segment 14: Kagman

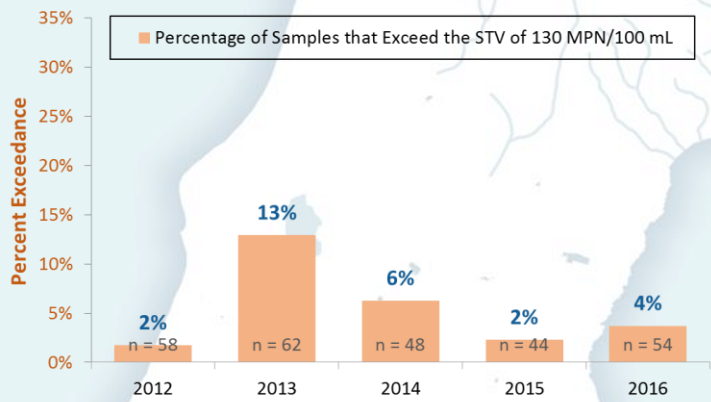


The Kagman watershed contains Marine Beach and Tank Beach Conservation Area, and hosts beautiful shorelines, turtle nesting sites, and scenic views. Significant infrastructural investments have helped manage stormwater and sediment, and improve agricultural irrigation. It is one of the island's growth areas for housing development, and contains a large road network, steep headwaters, and large lowland areas used for agriculture. This segment is included on the Clean Water Act 303(d) list of impaired waters for Enterococcus bacteria, and potential sources include stormwater runoff from maintenance & construction, and roads, as well as erosion and failing septic systems.

## Bacteria Sources



## Water Quality Trends



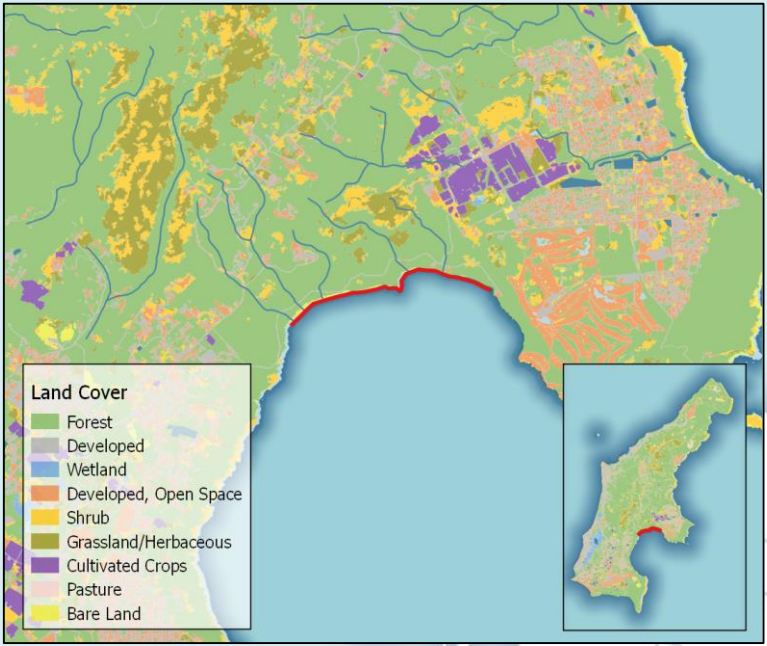
The STV (Statistical Threshold Value) approximates the 90<sup>th</sup> percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

Water quality measurements indicate elevated levels of Enterococcus bacteria, likely from road, construction & maintenance runoff during rain events, erosion, and to a lesser degree failing septic systems, livestock, agriculture, feral animals. The population growth in the watershed has led to increased housing and agricultural densities, likely contributing to waterbody impairment, and Kagman is not currently operating on a centralized wastewater treatment system. Over the past 5 years, water quality exceedances have decreased, ranging from 2 – 13%, with an average of 6%. Highest exceedances occur during the wet season, in September.

## Key Actions

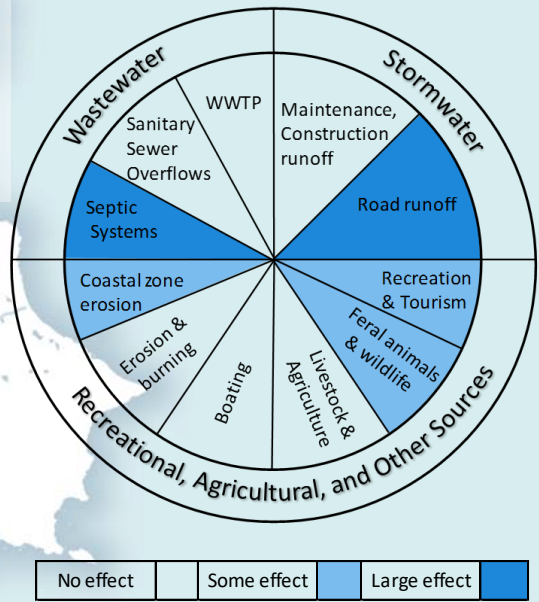
1. Address water quality issues, including completion of stormwater structures, that mitigate upland sources
2. Support feasibility studies to address wastewater treatment needs, (i.e. in development of a third wastewater treatment plant) & support water quality testing to track water quality issues
3. Work with NRCS and NOAA Fisheries on stormwater enhancement that could be supported across agency programs

# Segment 15: Lao Lao

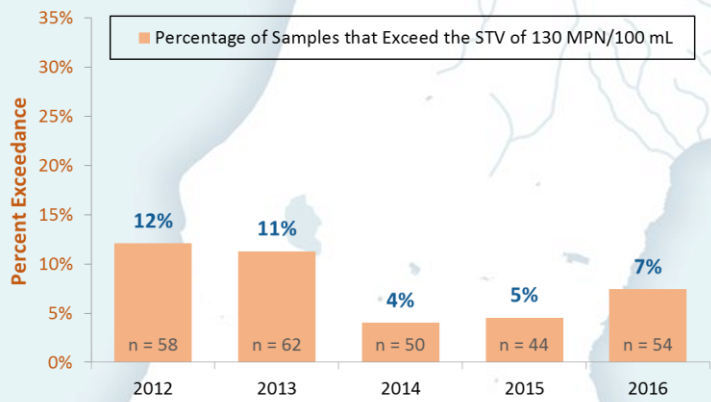


LaoLao Watershed contains the LaoLao golf resort and LaoLao Bay, home to some of the most popular snorkel and scuba sites on Saipan. For several years, various restoration and watershed enhancements have been prioritized in Lao Lao Watershed and it has been the recipient of project-level funding to improve water quality. These projects include improvement of parking facilities, outreach with tourism companies, and fortification of road surfaces. This segment is included on the Clean Water Act 303(d) list of impaired waters for Enterococcus bacteria, and potential sources include road runoff during storm events and failing septic systems.

## Bacteria Sources



## Water Quality Trends



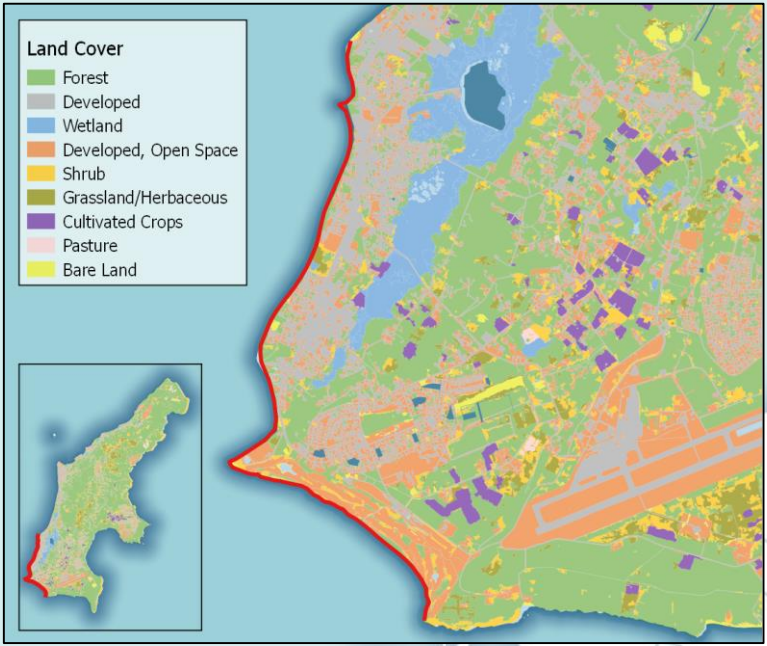
The STV (Statistical Threshold Value) approximates the 90<sup>th</sup> percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

Water quality measurements indicate elevated levels of Enterococcus bacteria, likely from road runoff during rain events and failing septic systems, and to a lesser degree recreation, tourism, and feral animals. Over the past 5 years, no significant changes in water quality trends have been observed: exceedances of water quality standards range from 4 to 12%, with an average exceedance of 8%. Highest exceedances occur during the wet season between August and October.

## Key Actions

1. Support monitoring of septic systems and potential discharge from golf courses to identify any point source contaminants
2. Assist in planning associated with unpaved roads in the area, particularly short sections that contribute sediment and pollutants directly to stream channels

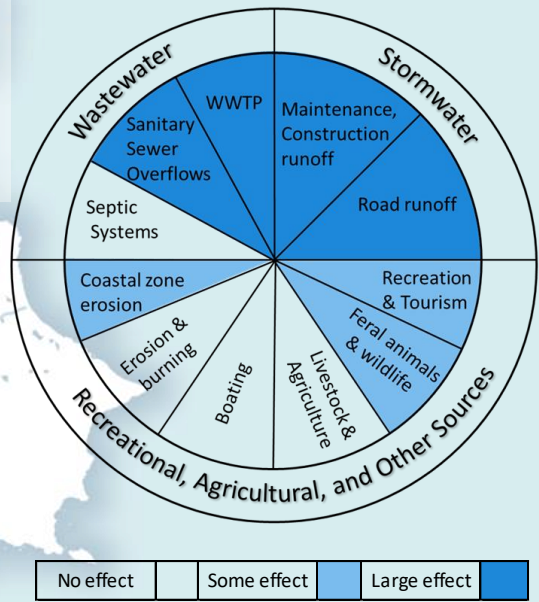
# Segments 17A & 18B: West Isley & South Susupe



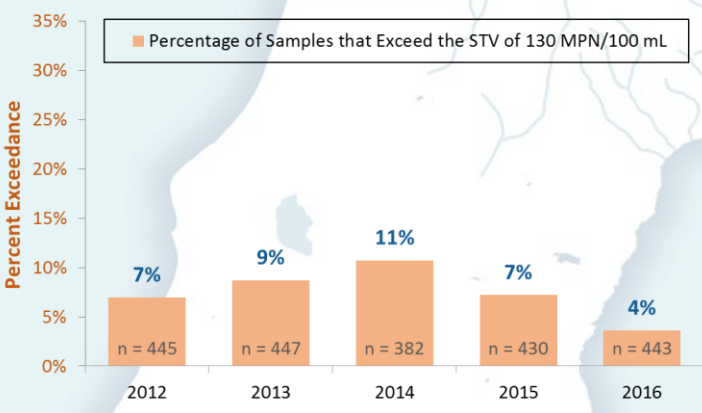
View of Point Agingan from Pak Pak Beach

West Isley and South Susupe are located on the southwestern side of the island. West Isley contains the WWII Koblerville Airfield, a golf course & resort, and Unai Dankulo beach, a popular destination for picnicking, fishing and snorkeling. South Susupe contains Sugar Dock, a popular boat launch, swimming and dive site. The watersheds also contain a sandy shoreline and popular beaches for local picnickers. These segments are included on the Clean Water Act 303(d) list of impaired waters for Enterococcus bacteria, and the greatest potential source of pollution is from the same municipal outfall, from the wastewater treatment plant located on Point Agingan.

## Bacteria Sources



## Water Quality Trends



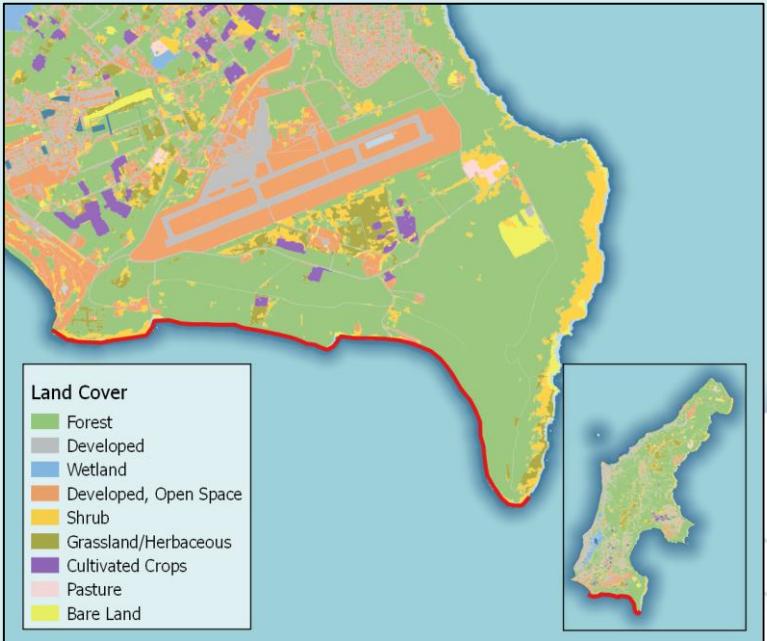
The STV (Statistical Threshold Value) approximates the 90<sup>th</sup> percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

Water quality measurements indicate elevated levels of Enterococcus bacteria, likely from a sanitary sewer overflow and wastewater treatment plant, as well as road runoff & construction runoff during rain events, and to a lesser extent, tourism. Over the past 5 years, no significant changes in water quality trends have been observed, though exceedances of water quality standards in the past year have been significantly less. Overall exceedances range from 4 to 11%, with an average exceedance of 7%. Highest exceedances are in October, when rainfall is high.

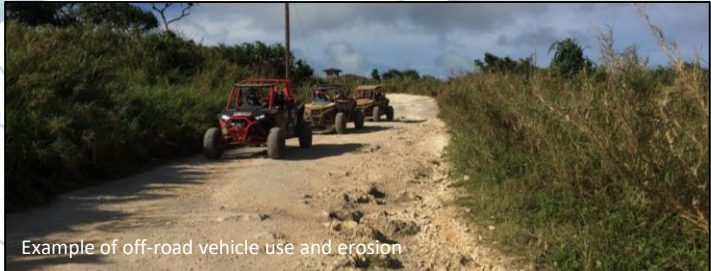
## Key Actions

1. Support ongoing plans and operations for improvements to the municipal wastewater treatment plant outfall (especially maintenance) & support active planning efforts to determine feasibility of increasing capacity for the treatment plant
2. Increase access to restroom facilities and garbage bins

# Segment 17B: East Isley



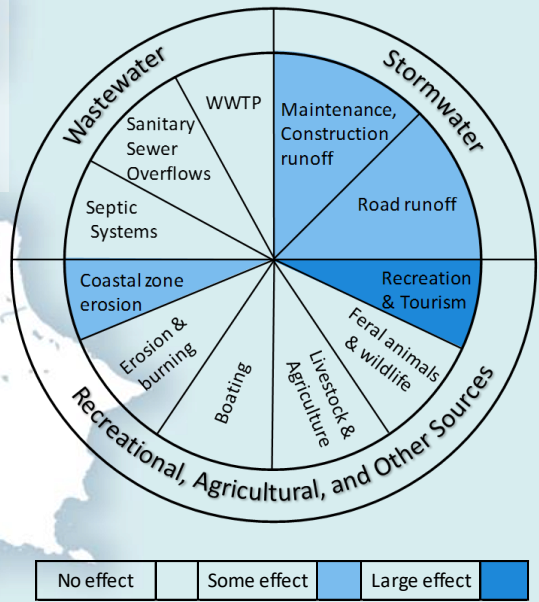
Obyan Beach



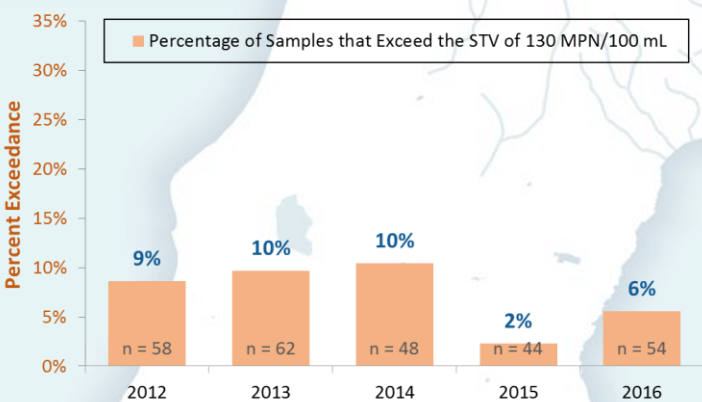
Example of off-road vehicle use and erosion

The Isley Watershed is a narrow watershed, originating near the center of Saipan and flowing south to Ladder, Obyan, and Boyscout beaches. The East Isley watershed contains the WWII Isley Airfield and Saipan’s International Airport in addition to beaches that support sea turtle nesting and boast scenic views. The watershed is mostly undeveloped, except for communities near the airport and beaches, including Obyan beach, a popular scuba and camping site. This segment is included on the Clean Water Act 303(d) list of impaired waters for Enterococcus bacteria, and potential sources include recreation & tourism and road & construction runoff during storm events.

## Bacteria Sources



## Water Quality Trends



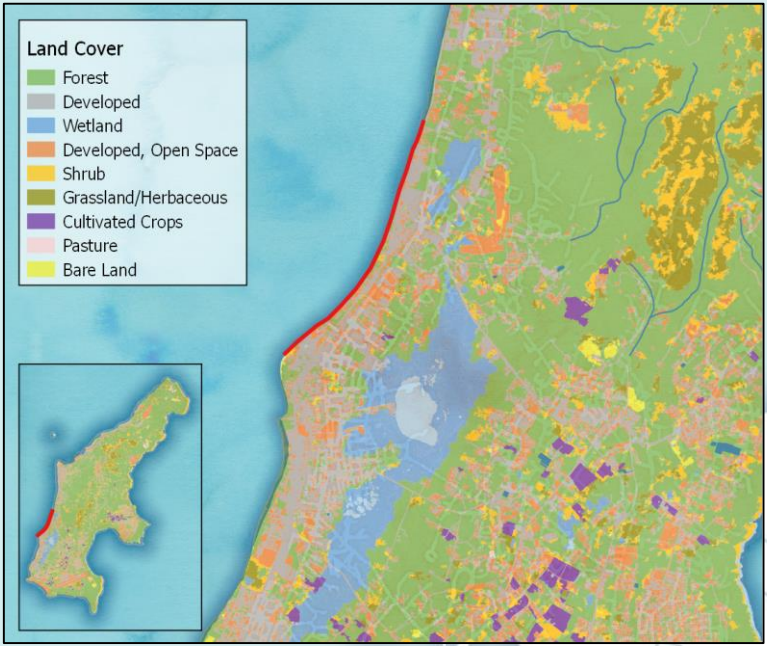
The STV (Statistical Threshold Value) approximates the 90<sup>th</sup> percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

Water quality measurements indicate elevated levels of Enterococcus bacteria, likely from tourism and recreation, as well as road runoff & construction runoff during rain events. Over the past 5 years, no significant changes in water quality trends have been observed: exceedances of water quality standards range from 2 to 10%, with an average exceedance of 8%. Highest exceedances occur during the wet season between August and September.

## Key Actions

1. Service and maintain restroom facilities for tourists
2. Install signage and raise awareness to “pack your trash” for visitors

# Segment 18A: Susupe North



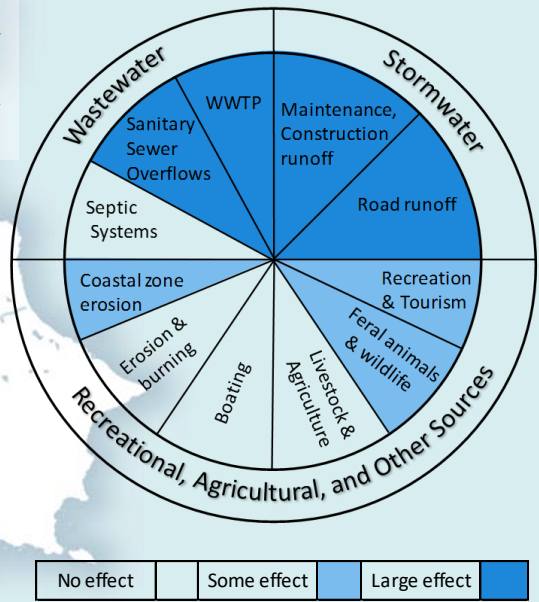
View of Saipan to the South, with Lake Susupe in the center



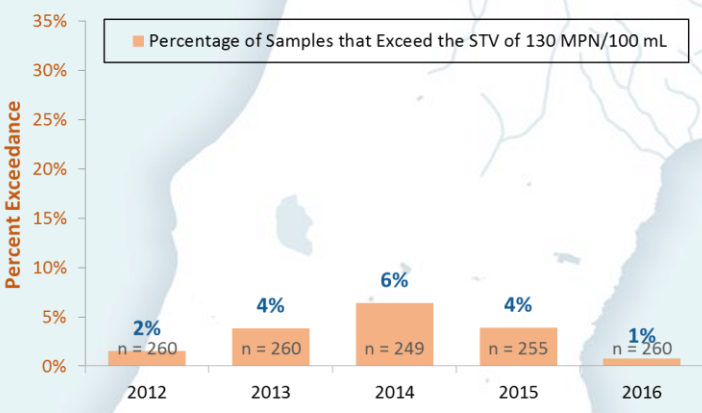
View of Point Agingan from Pak Pak Beach

The North Susupe watershed is located along the western shore of Saipan, and contains several resorts, hotels, and public beaches. Beaches are frequently visited by tourists and residents and contain scenic views, marine sports, swimming, and fishing. This segment is included on the Clean Water Act 303(d) list of impaired waters for Enterococcus bacteria, and potential sources include on-site wastewater treatment systems, sanitary sewer overflows, urban runoff, and livestock further upstream in the watershed.

## Bacteria Sources



## Water Quality Trends



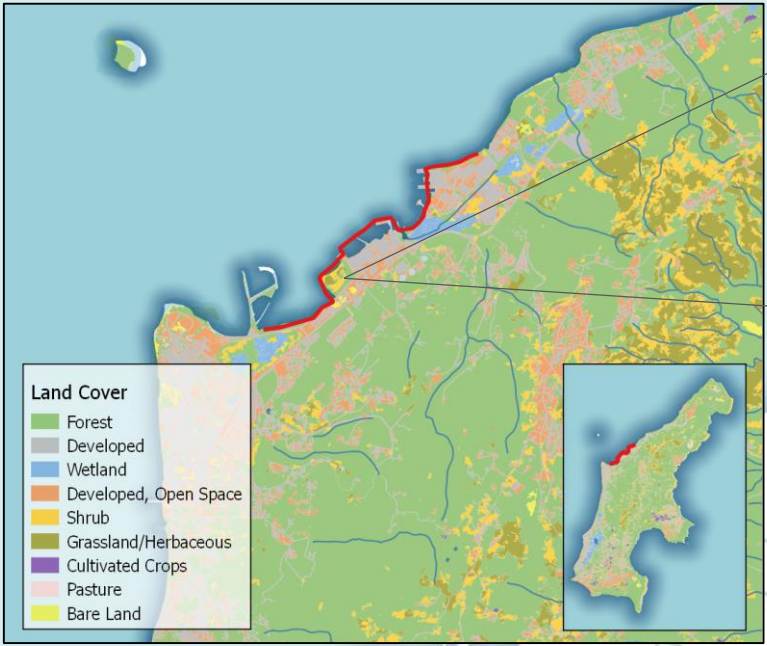
The STV (Statistical Threshold Value) approximates the 90<sup>th</sup> percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

Water quality measurements indicate elevated levels of Enterococcus bacteria, likely from the sewer lines in the watershed, as well as road runoff & construction runoff during rain events. Over the past 5 years, no significant changes in water quality trends have been observed: exceedances of water quality standards range from 1 to 6%, with an average exceedance of 3%. Highest exceedances occur during the wet season between July and September.

## Key Actions

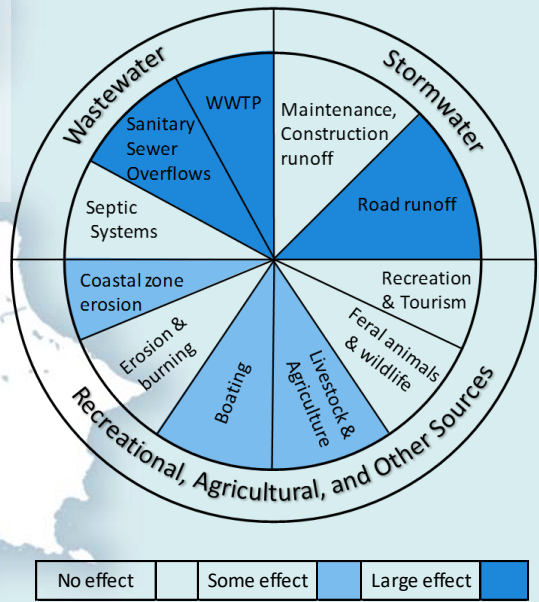
1. Support BECQ and other local agencies to determine types of wastewater infrastructure and methods of maintenance and citizen engagement (especially for septic sewage)
2. Work with CNMI government to evaluate options for water quality improvement along beaches and residential areas

# Segment 19A: West Takpochao North

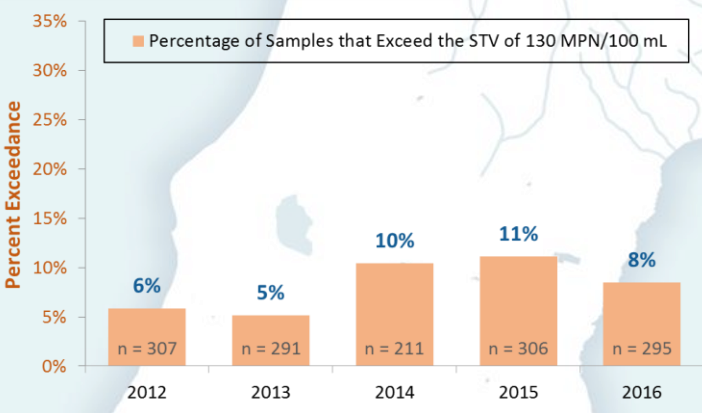


West Takpochao is the most developed and urbanized watershed in the CNMI. West Takpochao North, containing Saipan’s “industrial area,” includes Smiling Cove & Outer Cove Marinas, the DPW Channel Bridge and the Sea Plane Ramp. The upland areas are dispersed with neighborhoods, homesteads, and livestock farms. Hikers and tourists enjoy hiking along streams, and scenic views from the small mangrove area along the coast. This segment is included on the Clean Water Act 303(d) list of impaired waters for Enterococcus bacteria, and potential sources include a wastewater treatment plant (at Puerto Rico), the closed municipal dump, marinas, and livestock.

## Bacteria Sources



## Water Quality Trends



The STV (Statistical Threshold Value) approximates the 90<sup>th</sup> percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

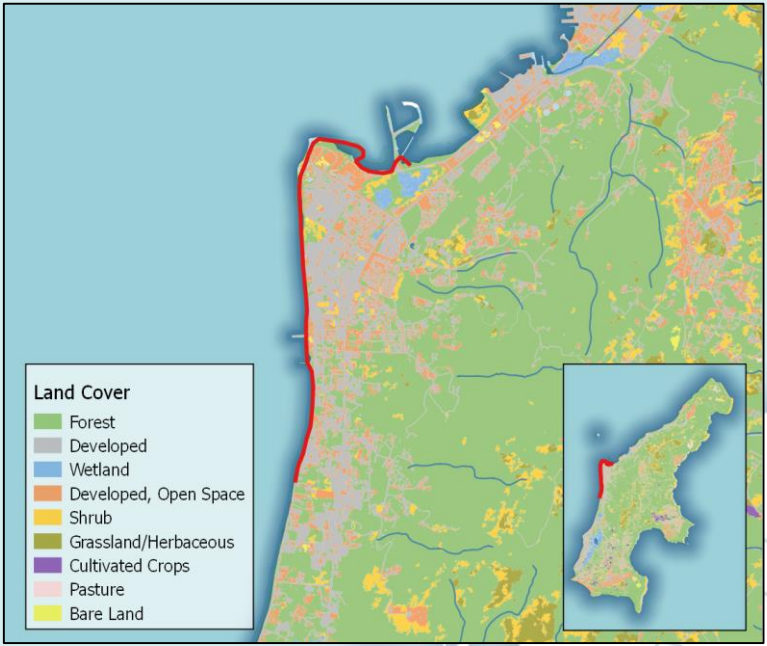
Water quality measurements indicate elevated levels of Enterococcus bacteria, likely from leakage from old wastewater infrastructure – much of which was built during Japanese occupation in the 1930s and 40s. Aging infrastructure and runoff from roads during rain events are major causes of water quality impairments. Over the past 5 years, no significant changes in water quality trends have been observed: exceedances of water quality standards range from 5 to 11%, with an average exceedance of 8%. Highest exceedances occur during the wet season

## Key Actions

1. Upgrade failing infrastructure at the wastewater treatment plant (the current infrastructure contains asbestos pipes and have been identified by CNMI government as a threat to water quality)
2. Expansion and enhancement of wetland vegetation, including mangroves and upland wetland areas to reduce stormwater runoff

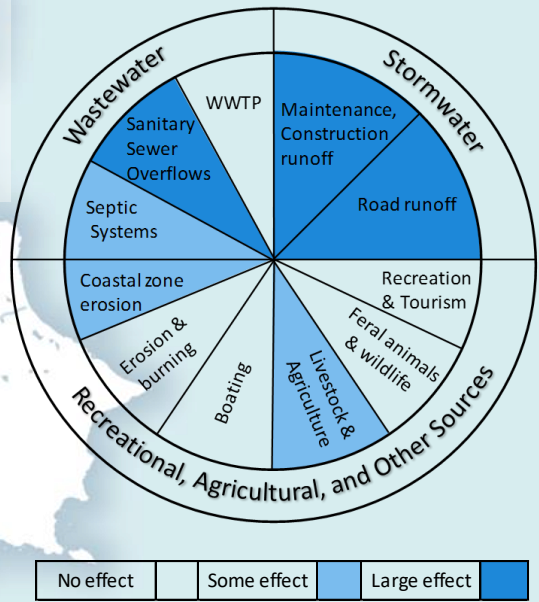


# Segment 19B: West Takpochao Central

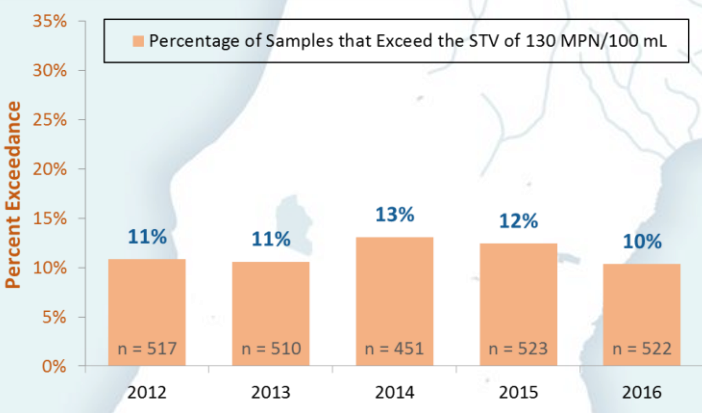


West Takpochao is the most urbanized watershed in CNMI, and is dynamic and complex. West Takpochao Central contains Micro Beach, American Memorial Park, and the Garapan Tourist District, Saipan’s busiest shopping and dining districts with many hotels, resorts, and other destinations. Micro Beach is also frequently visited by tourists for snorkeling, surfing, swimming, and enjoying Saipan’s Beach pathway. Upland areas contain small livestock farms and homesteads. This segment is included on the Clean Water Act 303(d) list of impaired waters for Enterococcus bacteria, and greatest potential sources of pollution are from a sanitary sewer overflow, and runoff from roads and construction/maintenance during rain events.

## Bacteria Sources



## Water Quality Trends



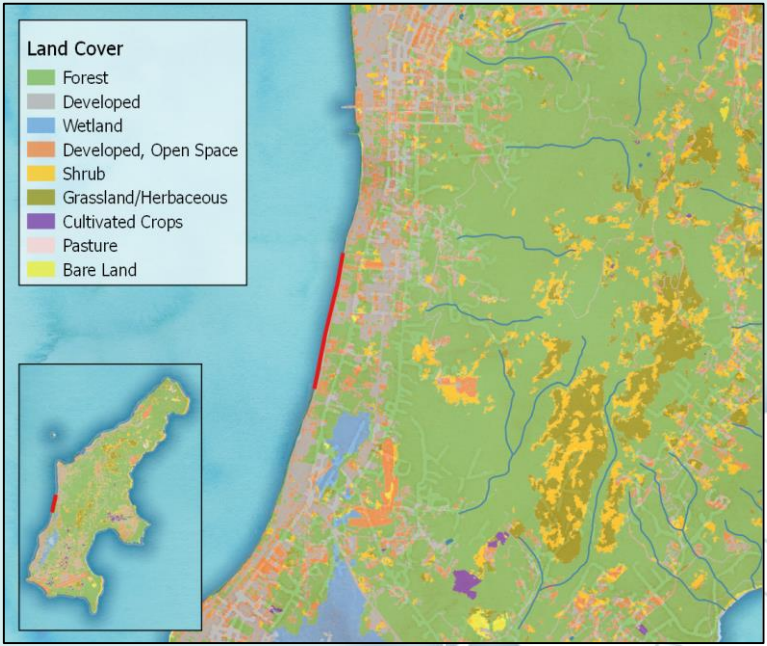
The STV (Statistical Threshold Value) approximates the 90<sup>th</sup> percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

Water quality measurements indicate elevated levels of Enterococcus bacteria, likely from a sanitary sewer overflow, as well as road runoff & construction runoff during rain events, especially due to construction of a new casino/hotel in the center of Garapan. Other sources are livestock from small piggeries and poultry farms in the upland areas. Over the past 5 years, exceedances of water quality standards have consistently been over 10%, reaching up to 13%, with an average exceedance of 11%. Highest exceedances are in the rainy season, and especially in October.

## Key Actions

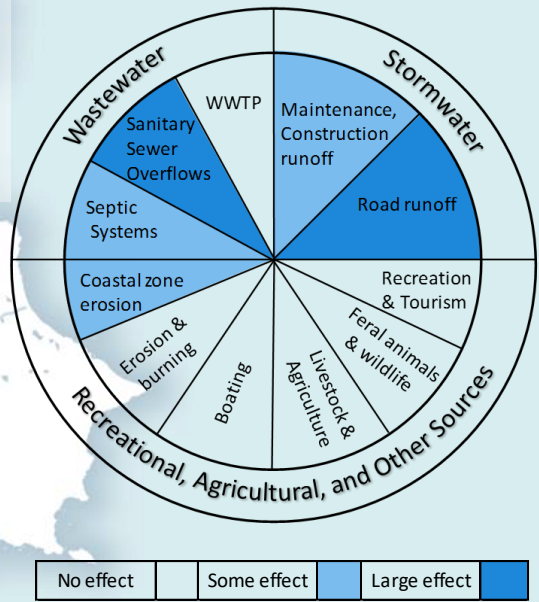
1. Support increased staffing or cross-training in development inspection and enforcement within BECQ & support training and implementation for wetland restoration
2. Review construction water quality practices for tropical island environments
3. Support review of the new casino/hotel/shopping mall wastewater volumes and treatment pathways
4. Consider beautification campaigns such as urban tree planting, bio-swales, and other vegetation-based flood mitigation designs

# Segment 19C: West Takpochao South

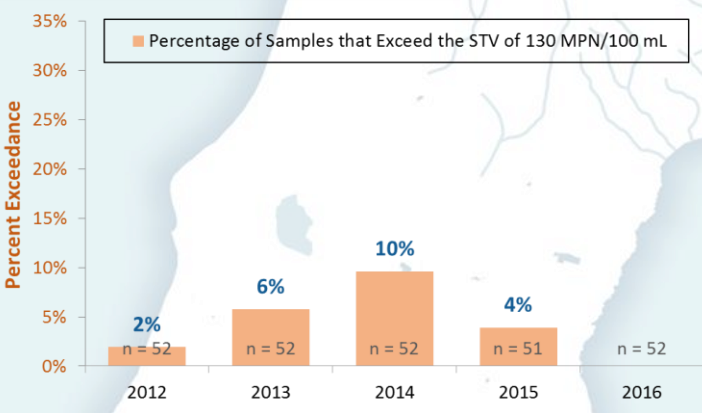


West Takpochao is the most urbanized watershed in CNMI, and is dynamic and complex. West Takpochao South contains two beaches: Chalan LauLau and Garapan Beach. The Saipan Beach Pathway runs from the base of the segment north through Garapan and into American Memorial Park (Segment 19B). The beach path is enjoyed by residents and tourists who bike, walk, and enjoy the ocean breeze along the walkway. Seagrass lines the coast line and no homes or hotels are located along the coast. This segment is included on the Clean Water Act 303(d) list of impaired waters for Enterococcus bacteria, and greatest potential sources of pollution are from failing wastewater systems and stormwater runoff that drains the large, paved, populated area into the lagoon.

## Bacteria Sources



## Water Quality Trends



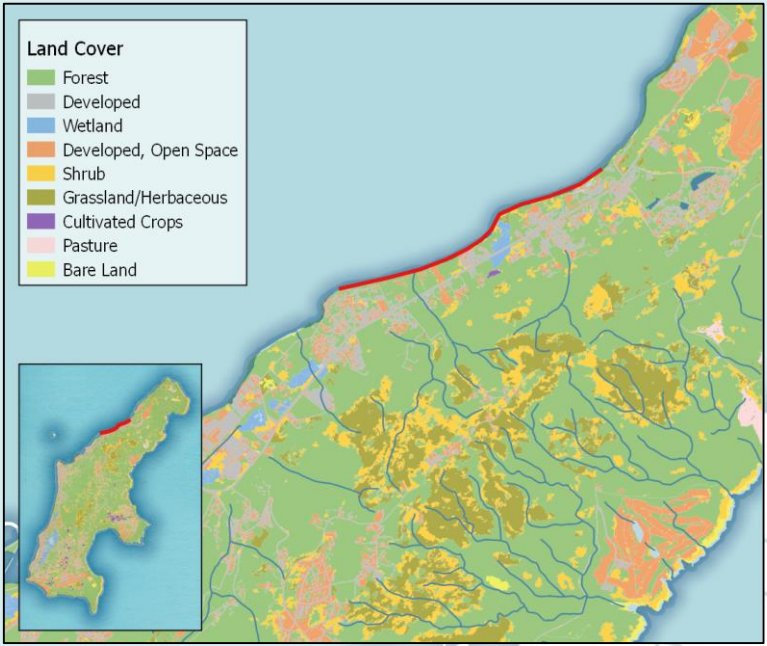
The STV (Statistical Threshold Value) approximates the 90<sup>th</sup> percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

Water quality measurements indicate elevated levels of Enterococcus bacteria, likely from a sanitary sewer overflow, as well as road runoff & construction runoff during rain events. Over the past 5 years, exceedances of water quality standards were highest in 2014, reaching up to 10%, and no samples exceeded the STV in 2016. There was an average exceedance of 4% and highest exceedances were observed in July.

## Key Actions

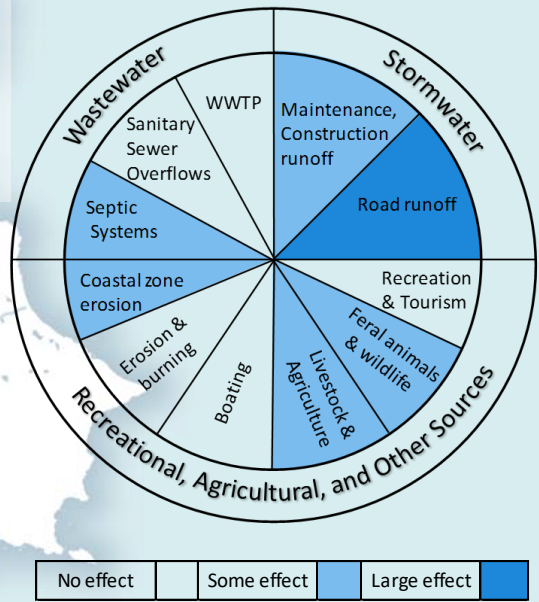
1. Assess wastewater systems, including septic
2. Support BECQ & NRCS watershed planning, including outreach in rural areas to take advantage of wastewater solutions for livestock
3. Support planning along Middle Road for wastewater treatment
4. Identify road-derived sediment sources to create mitigation to trap sediment during high flow events
5. Work with NOAA Fisheries and others to improve land-derived pollution sources affecting Lighthouse Reef Reserve

# Segment 20A: North Achugao

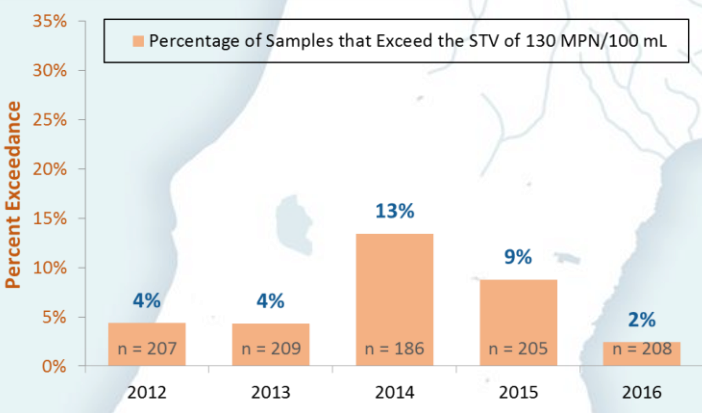


North Achugao watershed is located in the northwestern part of Saipan, and contains beaches that residents enjoy for swimming, fishing, and picnicking. This watershed contains three hotel complexes, of which two have been out of operation in recent years due to new renovations. Biological conditions in the watershed have improved, likely due to mass vacancy in these resorts due to renovations, and less beach goers within the watershed. This segment is included on the Clean Water Act 303(d) list of impaired waters for Enterococcus bacteria, and sources of pollution are likely connected to the resort renovations, which cause an increase in workers in the area and higher wastewater flow as well as agriculture and livestock further upstream..

## Bacteria Sources



## Water Quality Trends



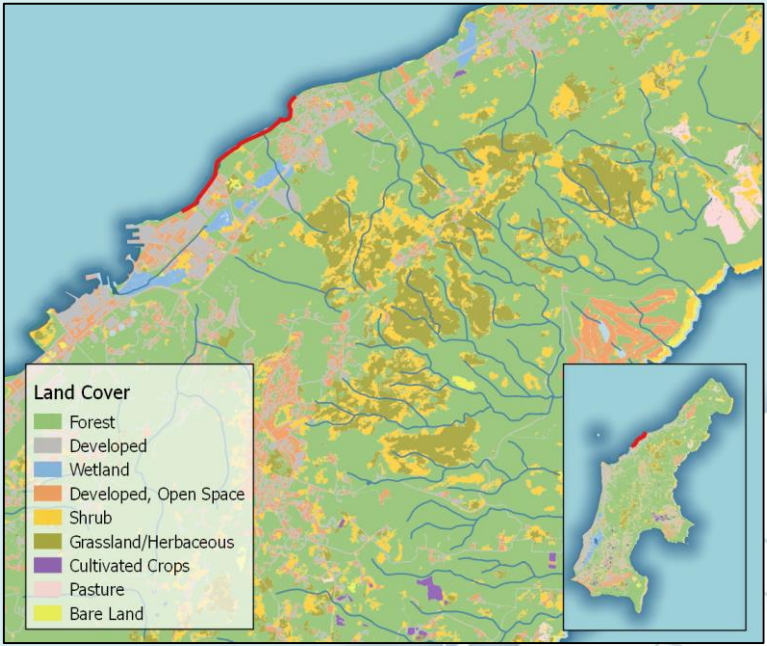
The STV (Statistical Threshold Value) approximates the 90<sup>th</sup> percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

Water quality measurements indicate elevated levels of Enterococcus bacteria, likely from road runoff during rain events, as well as septic systems. Other sources include construction runoff during rain events, and to a lesser extent, feral animals and agriculture. Over the past 5 years, exceedances of water quality standards were highest in 2014, and range from 2 – 13%, with an average exceedance of 7%. Highest exceedances were recorded in the rainy season, especially in September and October.

## Key Actions

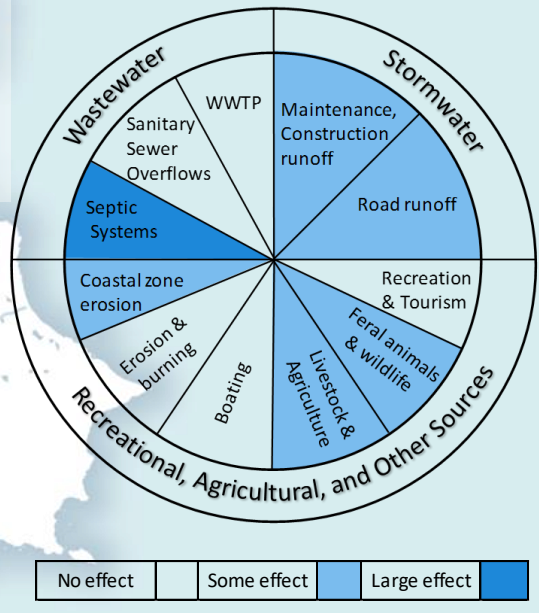
1. Support regular site reviews of local piggeries and other local farm sites, and support continued outreach and capacity building work with farmers and local managers to comply with water quality standards
2. Engage CNMI government in planning for population growth from migratory & immigrant pathways
3. Support ongoing watershed efforts in reducing fires and engagement in replanting and restoration

# Segment 20B: South Achugao

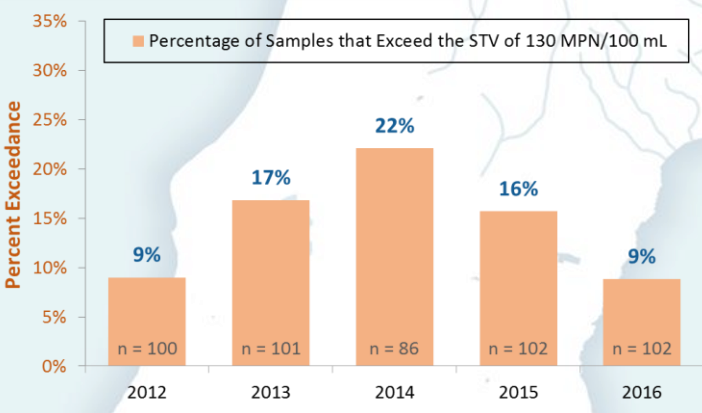


South Achugao Watershed contains the Agatan and part of the Dogas stream systems that flow to Tanapag Lagoon, and contains sandy beaches enjoyed by locals who fish, swim, and picnic in the area. The lower watershed contains industrial areas and coastal wetlands, while upper areas are mostly homesteads and large grasslands maintained by fire. This segment is included on the Clean Water Act 303(d) list of impaired waters for Enterococcus bacteria, and greatest potential sources of pollution are from septic systems, runoff from roads and construction, and some agricultural practices.

## Bacteria Sources



## Water Quality Trends



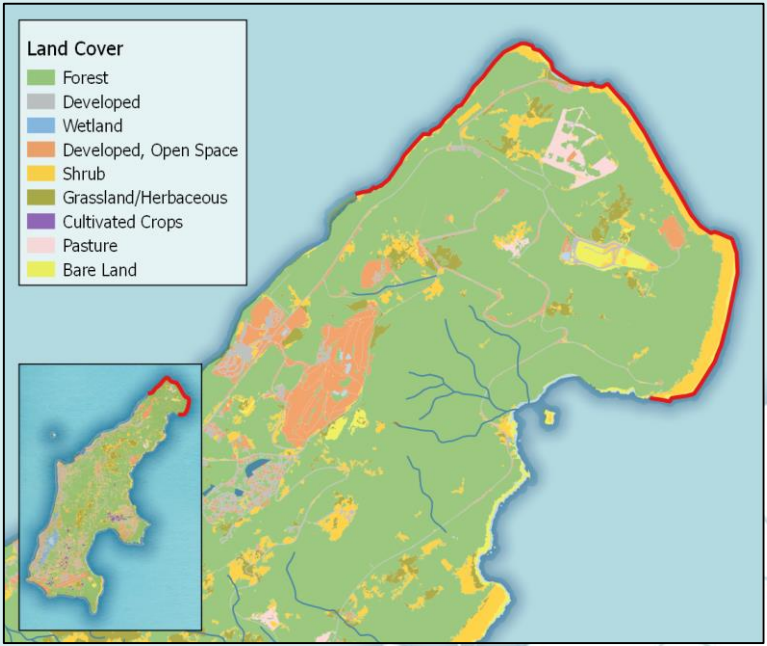
The STV (Statistical Threshold Value) approximates the 90<sup>th</sup> percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

Water quality measurements indicate elevated levels of Enterococcus bacteria, likely from failing septic systems and wastewater infrastructure, especially as population grows and temporary housing increases. Other sources include road and construction runoff during rain events, and to a lesser extent, feral animals and agriculture. Over the past 5 years, exceedances of water quality standards were highest in 2014, and range from 9 – 22%, with an average exceedance of 14%. Highest exceedances are in the rainy season, between August and October, but are also high in December and January.

## Key Actions

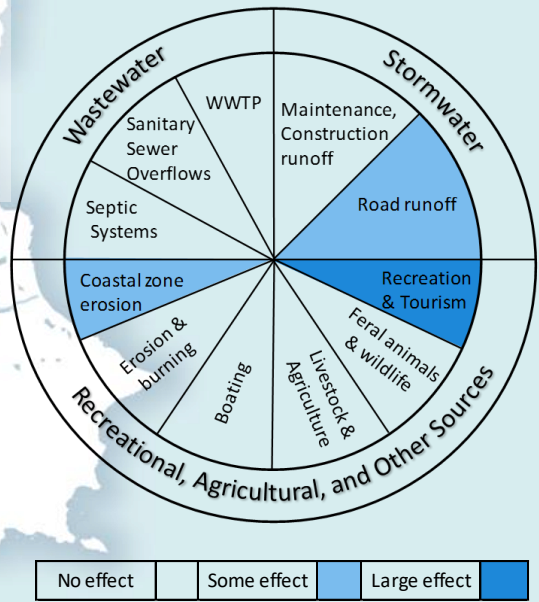
1. Support regular site reviews of local piggeries and other local farm sites, and support continued outreach and capacity building work with farmers and local managers to comply with water quality standards
2. Engage CNMI government in planning for population growth from migratory & immigrant pathways
3. Support ongoing watershed efforts in reducing fires and engagement in replanting and restoration

# Segment 22: Banaderu

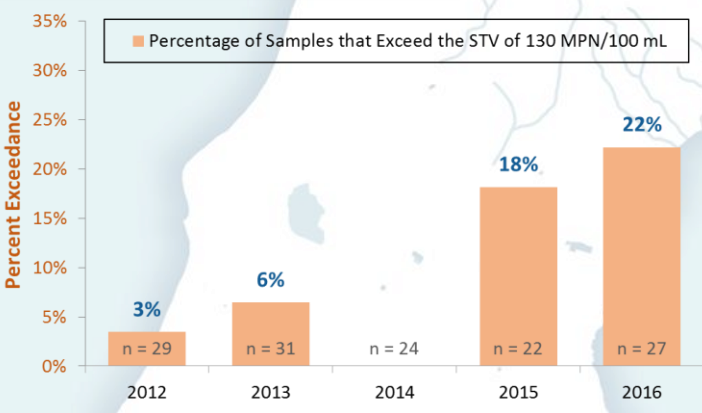


Banaderu, the northernmost watershed on Saipan, is known for its excellent snorkeling, cliff diving, and scuba diving opportunities. Grotto Cave, a naturally formed clear-water grotto contains deep clear waters and is a popular destination for recreation. In fiscal year 2015, public advisories for Grotto Cave increased significantly due to Enterococci bacteria exceedances, and therefore, Banaderu was added to the Clean Water Act 303(d) list of impaired waters. The greatest potential sources of pollution are from recreation and use of public restrooms, which are designed with a septic holding tank and maintained with regular pump out practices.

## Bacteria Sources



## Water Quality Trends



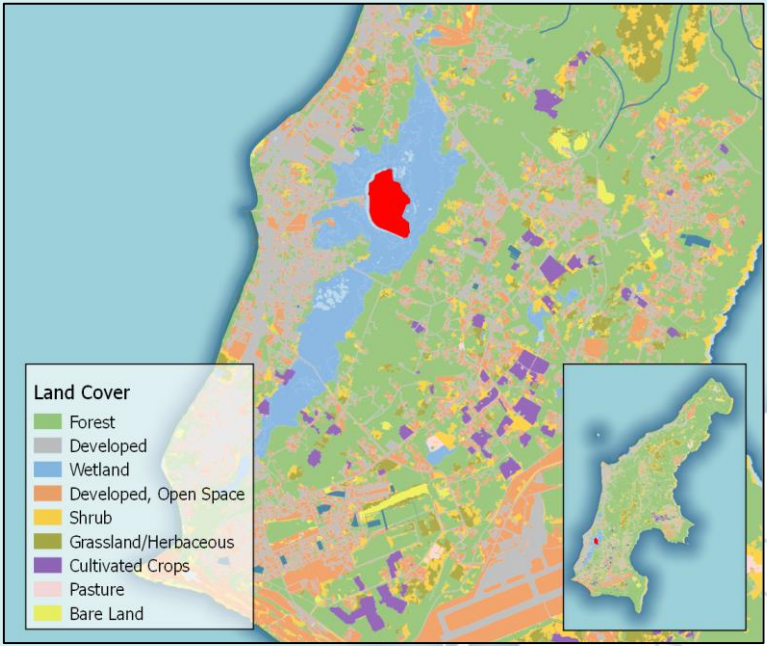
The STV (Statistical Threshold Value) approximates the 90<sup>th</sup> percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

Water quality measurements indicate elevated levels of Enterococcus bacteria, likely from recreation and tourism at Grotto Cave. Other sources include road runoff during rain events. Over the past 5 years, exceedances of water quality standards were highest in 2016, and range from 0 – 22%, with an average exceedance of 10%. Highest exceedances were observed in November, but are also high throughout the rainy season, especially between August and October.

## Key Actions

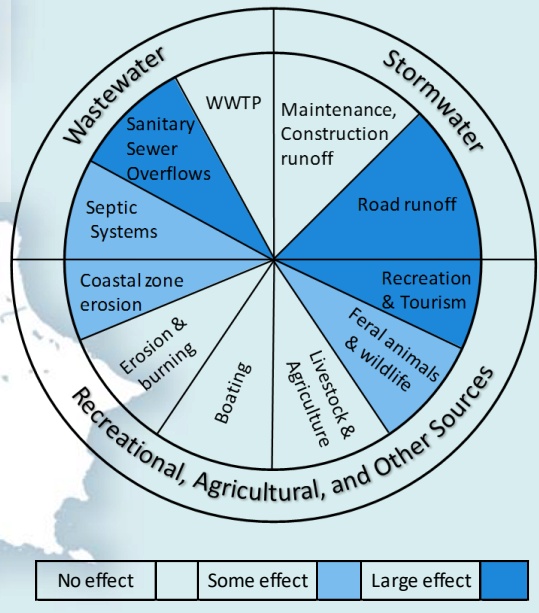
1. Upgrade restrooms at the Grotto, closing the park when the bathroom is not available (i.e. outside of regular business hours), and install an entrance gate.
2. Establish user fees which will be used to increase Ranger presence and provide maintenance and enforcement in the Grotto
3. Begin mandatory Tour Operator Certification Course for tour operators and install visitor friendly images about proper use of facilities.

# Segment 18LAK: Susupe Lake

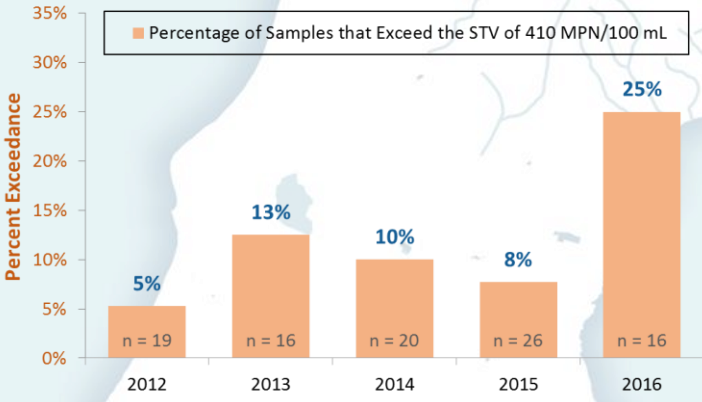


Lake Susupe is a unique shallow lake and wetland habitat complex, one of the last open water wetland complexes in the CNMI. The wetland area is surrounded by development housing and is located in the southwestern portion of the island. The lake is enjoyed by residents who boat, kayak, and fish in Lake Susupe’s waters, and naturalists, who enjoy bird watching and exploring the area. This lake is included on the Clean Water Act 303(d) list of impaired waters for *Escherichia coli* and greatest potential sources of pollution are from septic systems, a sanitary sewer overflow, and runoff from roads and construction.

## Bacteria Sources



## Water Quality Trends



The STV (Statistical Threshold Value) approximates the 90<sup>th</sup> percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

Water quality measurements indicate elevated levels of *E. coli* bacteria, likely from failing septic systems and wastewater infrastructure, as well as runoff from roads and construction in the residential areas surrounding the lake, and to a lesser extent, feral animals. Over the past 5 years, exceedances of water quality standards were highest in 2016, and range from 5 – 25%, with an average exceedance of 11%. Highest exceedances are in the rainy season, between July and October.

## Key Actions

1. Support BECQ and other local agencies to determine types of wastewater infrastructure and methods of maintenance and citizen engagement (especially for septic usage)
2. Work with CNMI government to evaluate options for water quality improvement