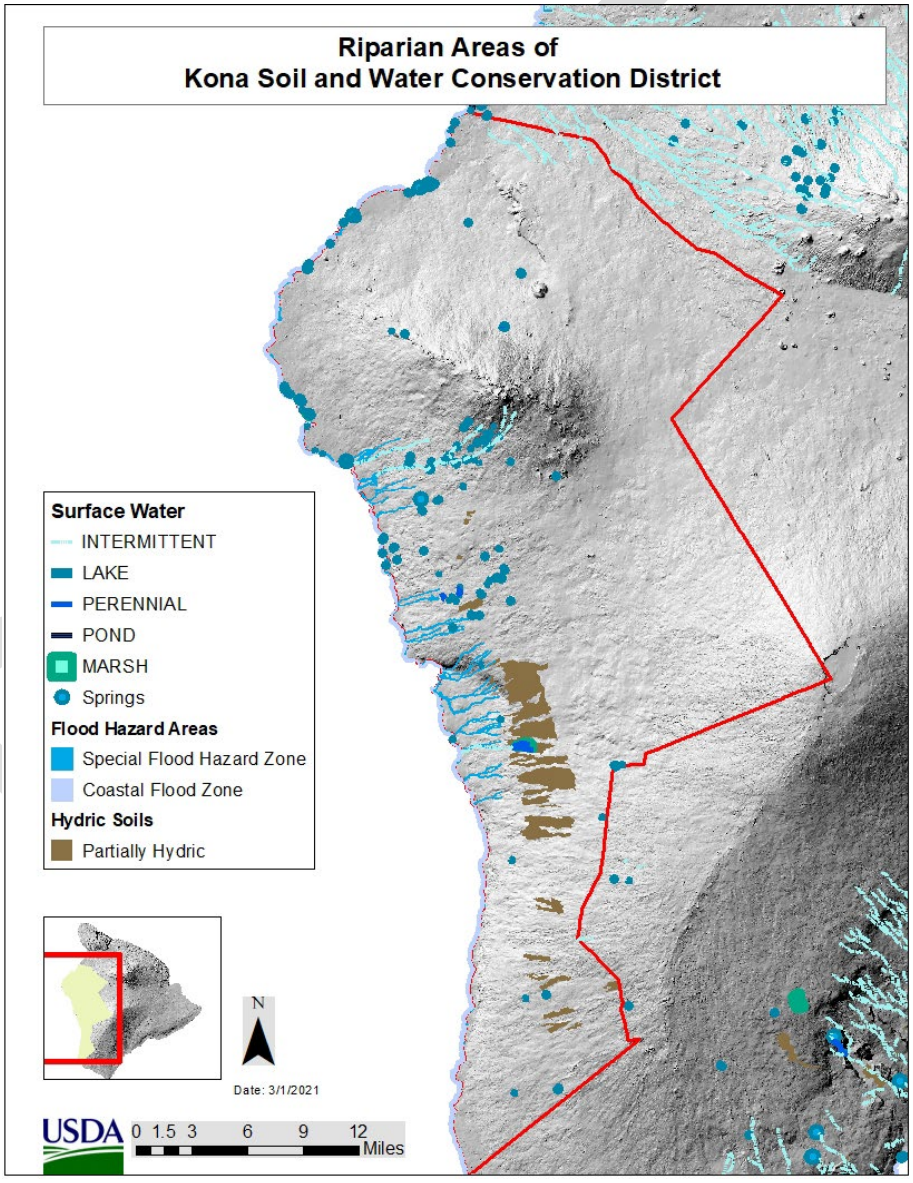
KONA Climate Adaptation – Minimizing Impacts from Severe Storm Events

-Concentrated Erosion and Soil Loss
-Coastal Water Quality and Reef Habitat Sedimentation

PILOT
TARGETED CONSERVATION PROPOSAL

September 2021

PROJECT TITLE: Kona Climate Adaptation – Minimizing Impacts from Severe Storm Events
LOCATION: Kona
SERVICE CENTER: Kealakekua
DISTRICT CONSERVATIONIST: Laura Nelson
LEAD PARTNER:
PROPOSED START DATE: FY 2023
PROPOSED END DATE:



Kona Climate Adaptation – Minimizing Impacts from Severe Storm Events

Protection and Restoration of Kona's Hydrologic Functions

-Reducing Concentrated Erosion From Stormwater Runoff
-Reducing Sedimentation of Reefs and Pollution of Coastal Waters
-Increasing Long-Term Groundwater Quality and Quantity
-
Pilot Targeted Conservation Proposal

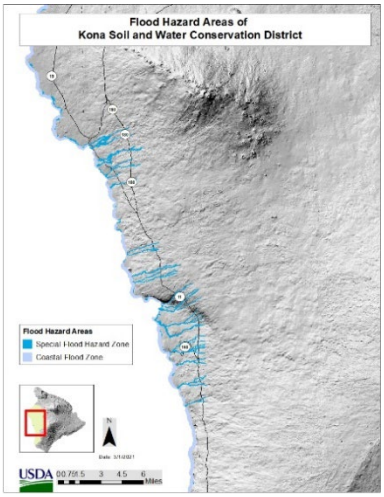
Project Overview

Overview/Background Information:

What is the purpose and need for this TCP, how does it help achieve LRP vision and goals?

You cannot visualize "Hawaii" without seeing the ocean. It is an iconic part of what makes this island a tropical paradise. The coral reefs that surround our island are some of the most productive and diverse ecosystems on earth, home to fish, turtles, dolphins, small sharks, and innumerable invertebrate species; the whales that arrive each winter are found close to shore when giving birth. Tourism in Hawaii would not survive without the healthy coral reefs in our oceans and Kona's coastline is home to more than 8,000 acres of reef representing nearly 60% of the reef area on Big Island.

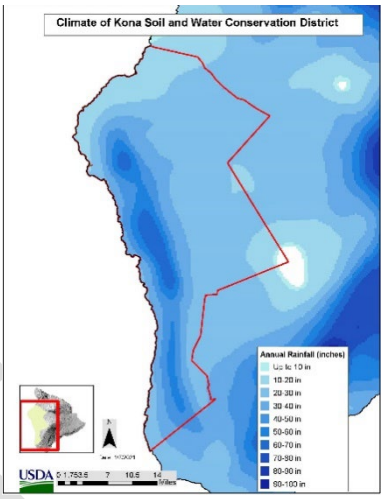
Perhaps the most important and vital resource of Kona are its clean and abundant waters including our clean freshwater aquifer and clean coastal surface water surrounding the island. Water from the wells at higher elevations provides some of the purest drinking water in the world. When we surf, dive, and fish in clean water, eat healthy seafood, and enjoy an unpolluted beach we are benefiting from good water quality. The quality of our water equals the quality of life! The ocean waters surrounding Hawaii Island remain relatively clean and are widely used by tourists and residents alike.



However, land management impacts coupled with extreme storm events have led to growing water quality concerns. In recent years, there have been numerous flooding events that result in damages to infrastructure and contaminate our coastal waters in brown water events that create both a health hazard and severely degrade valuable reef habitats.

Located on the leeward volcanic slopes of Hualalai and Mauna Loa, our landscapes are young geologically and are characterized by shallow channel development with a limited capacity to carry storm runoff during high intensity storms. Combined with the steep volcanic slopes and split and braided channels, management of massive rainfall events

and resultant flooding makes management very difficult without a landscape level approach. While our natural land cover, native forest over highly porous lava substrate is well suited for sponging and infiltrating water into our aquifer, land cover conversion and concentration of stormwater runoff has disrupted and contaminated our natural hydrologic cycle.



Due to high intensity and localized characteristics of storms, overland flow is possible almost anywhere in the watershed. Alterations to the landscape due to development also can alter surface flow patterns result in new erosion channels. Many flood corridor areas in Kona are highly disturbed both due to feral ungulates and human alterations. The conversion of land cover in the watershed and widespread application of chemicals, and contaminants has affected the quality of water entering the ocean and percolating into ground water supplies (Figure 1).

The vision of the Kona Soil and Water Conservation District (KSWCD) is to provide for healthy, productive, and resilient landscapes and watersheds which allow our native ecosystems and marine environments to function at their highest potential, thereby increasing the benefits to watersheds, wildlife, forests, grasslands, croplands, and people alike. Addressing stormwater runoff is therefore vital to this vision.

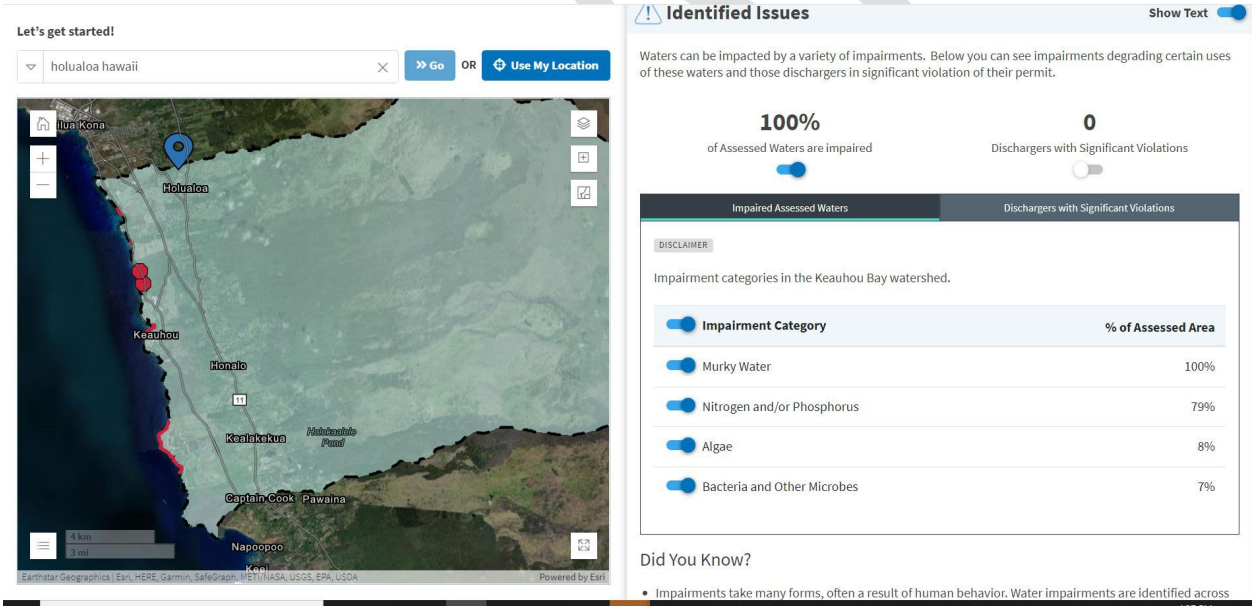


Figure 1 Coastal Water Quality Impairment. From EPA at mywaterway.epa.gov.

Problem Statement:

What is the specific issue or resource concern?

The problem lies at the intersection of climate driven storm intensity, stormwater runoff management, and land cover/land management resulting in natural resource concerns including degradation of coastal water quality and coastal habitat, and increases in concentrated erosion and soil loss, as well as infrastructure damage.

Why is it a concern?

It is a concern because our water quality is vital to our quality of life and economy. Our soils are thin and fragile and being washed into the reef. During storm events there is infrastructure damage due to poorly defined drainage channels along with development and disturbance in sensitive areas.

The trend of continued disturbance to the watershed capture area and channelization of drainage areas results in greater and greater natural resource degradation.

Where is it occurring?

The issue is concentrated near flood corridors throughout Kona district, but particularly in central Kona with some of the oldest, most vulnerable soils in the highest rainfall areas.

What are the causes of the problem?

The problem occurs during a severe storm event (which may be increasing due to climate change). Kona's drainages are shallow and not well defined and have limited capacity to carry water downslope and so are easily overwhelmed by small alteration of drainage patterns/concentration of flow. Even construction of ranch roads or berms created by bulldozer land clearing can (intentionally or unintentionally) alter the concentration of stormwater runoff. Even where there is existing drainage infrastructure, the addition of concentrated flow can overwhelm and damage aging structures.

What is the extent of the problem?

This is a particularly pressing issue for the mid and lower elevations of central Kona and the affected reef and coastal waters.

Description of Goals and Objectives:

What are the locally defined desired future conditions, what does success look like?

- Reduce/eliminate contaminated stormwater discharge into nearshore coastal waters.
- Increase the amount of stormwater that is captured, filtered and infiltrated into the aquifer
- Reduce/eliminate concentrated sediment erosion channels in treated areas.

What needs to be done to solve the problem?

- Increase area of the watershed that sponges stormwater – Riparian buffers, conservation cover, tree canopy in mid elevations that receive heavy rainfall, vegetative barriers, critical area plantings.
- Increase vegetative infrastructure strategically captures filters and infiltrates stormwater, riparian buffers, vegetative barriers, infiltration basins.
- Reduce peak discharge volumes by increasing ground cover and canopy cover in high rainfall areas, and creating a system of infiltration basins in known drainage and high runoff areas.
- Reduce erosion where water flows – Stream crossings/ access rds/ lined waterway/grassed waterways.
- Increase outreach and awareness of stormwater runoff and how it can be addressed.

What is the goal of the strategy?

The goal is to build capacity to address this issue by increasing community awareness, developing capacity to design locally adapted/appropriate structural infrastructure, increase use of vegetative conservation practices to address the issue, develop relationships with partners in a pilot effort.

How will progress towards the desired future conditions be measured?

Progress will be measured by monitoring impacts and effectiveness of installed conservation practices. Metrics could include:

- Tracking brown water events in treated watersheds.
- Tracking area/acres treated/increasingly vegetated.
- Installation and monitoring of rain gauges that monitor precipitation fall in targeted watersheds.
- In buffer area, amount of vegetative cover maintained.
- In concentrated flow area, whether concentrated flow problem has been treated.

What are the expected environmental, economic, and social outcomes?

Improved Ground and Surface Water Quality: Due to heavy downpours and thin soils over porous lava substrates, Kona landscapes are extremely vulnerable to the leeching of both nutrients and chemicals into the ground water. These heavy downpours coupled with steep slopes makes Kona coastal waters highly susceptible to contaminated surface runoff. Increasing vegetative cover in areas upslope of concentrated flow problems is expected to help minimize pollution runoff and leaching during heavy

rain events. Water control structures such as infiltration basins installed in problematic drainages is expected to reduce ocean reef sedimentation by allowing sediment to settle out up slope and reducing the peak volumes and erosiveness as water is discharged downslope.

Areas that are being managed for flood corridor buffers should be kept clear of contaminants including petroleum/herbicide/chemical storage and disposal. But also, minimize application of pesticides, nutrients and other contaminants in the area close to precipitation driven concentrated flow/ drainage areas. These management changes are expected to improve water quality/minimize degradation of water quality.

Increasing carbon sequestration: Maximizing soil cover and particularly in riparian buffer areas is expected enable soils to function to store organic carbon and reverse organic matter and carbon loss from soils due to bare, disturbed soil.

Reduced Soil Loss from Erosion: Critical area plantings, conservation cover, vegetative barriers on steep slopes are all expected to minimize water erosion by keeping soil covered, minimizing soil disturbance, and keeping live roots in the soil all helping reduce erosion during heavy rain events.

Improve Weather Resilience: Kona is known for both heavy, localized downpours throughout the summer rainy season, along with cyclical droughts. Conservation practices including keeping soils covered to reduce stormwater runoff and help filter and infiltrate water into the aquifer will help recharge the aquifer during wet periods.

Increase profits/production – reduce losses: Stormwater runoff damages infrastructure and leads to costly (time and money) repairs for land owners, can cause damage to crops and reduce the usefulness of an area. Sediment deposition on nearshore reefs also destroys reef productivity and community assets in the long-term.

Increased community resilience and cohesion: Our outreach and capacity building strategy will help build community resilience by connecting land managers facing similar challenges through networking, and by sharing lessons learned with other farmers through outreach events and farm tours.

Partnership and relationship building: Develop relationships with local partners and partner agencies to address this issue, improve ability to collaborate and implement watershed planning in the future.

Will this project help producers meet or avoid natural resource regulatory requirements? If so, describe how.

Alternatives:

What alternatives are there for solving the problem (short summary of alternatives, describe what happens if no action is taken)?

No Action Alternative

Current trends in land management combined with future outlooks of severe storm events in the face of climate change suggest that in a No Action Alternative scenario, the problems of concentrated erosion, infrastructure damage from flooding, reef and coastal water quality degradation is projected to continue and worsen.

Due to high intensity and localized characteristics of storms, overland flow is possible almost anywhere in the watershed. Some drainage channels and flood control infrastructure installed ~50 years ago are failing during large flood events resulting in on farm roadways and culverts being washed out. Alterations to the landscape due to development also can alter surface flow patterns result in new erosion channels. Without addressing the problem, it will likely continue to get pushed around which may result in flooding in unexpected areas as existing drainage infrastructure is unable to carry the large peak quantities of flow during a storm.

Flood corridor areas in Kona are highly disturbed both due to feral ungulates and human alterations. There are numerous minor tributaries and braided portions of streams that have not been mapped and will continue to present problems as the landscape is altered and development increases, causing additional flooding problems along these poorly defined waterways. A coordinated, landscape level approach is needed to address this growing resource concern.

Alternative 1: Climate Adaptation – Minimize Impacts from Severe Storm Events

Rather than continue the status quo alternative, alternative 1 begins to address the issue by implementing a pilot targeted conservation project to address both acute concentrated erosion places and also reduce the peak volumes of stormwater runoff by increasing vegetative cover in key buffer areas and slowing and infiltrating stormwater on the landscape.

Alternative 1 will support implementation of conservation activities that improve and restore the hydrologic functions of the landscape within targeted watersheds and address areas of concentrated erosion. This alternative is a pilot to build capacity within the NRCS field office to address these resource concerns, and also begin outreach though on-farm demonstrations and partnership building to address the issue in a comprehensive manner.

These on farm demonstrations coupled with outreach, education, and partnership building will help steer future investments and conservation efforts to address this landscape level issue.

NEPA Considerations:

For Federal financial assistance programs such as EQIP, National Environmental Protection Act (NEPA) review is required and will be completed on a case-by-case basis. The NRCS environmental evaluation process, which includes cultural resources and threatened and endangered species reviews, will

consider the environmental effects of the proposed actions and recommend ways to avoid, minimize or mitigate adverse effects before implementing the action. No negative environmental impacts are expected from reducing stormwater runoff using vegetative practices and small scale engineered structures for water control on existing drainage channels.

Every other year, in keeping with the Clean Water Act, the Department of Health reports the status of surface water quality to the US Environmental Protection Agency (EPA). This Section 303(d) report identifies those water bodies which do not meet the State's Water Quality Standards. The most recent report identified ten marine areas along the Kealakekua Bay watershed as being impaired.

Proposed Solution and Actions:

What is the proposed solution?

Alternative 1 is the proposed solution in which a pilot project is implemented to address landscape-scale stormwater runoff issues with combined vegetative practices, water control structural practices in key erosion areas, water quality monitoring at watershed outlets, and community/stakeholder education and outreach.

Why is it the preferred solution?

Alternative 1 is the preferred solution because it starts a path forward to addressing a very significant landscape level problem and helps to address several resource concerns that are important to the community. Because this is a pilot project, lessons learned will be used to develop a larger scale proposal.

What information about the solution must be considered to meet the objectives?

There are many existing conditions which could present challenges in meeting the objectives.

Lack of Awareness: Due to the flashy nature of Kona's flood corridors and rapid vegetation growth, it is often hard for community members to recognize these areas as ephemeral waterways. In the past, many flood corridors have been used as dumping grounds because they are low areas on the landscape without the understanding or awareness of the impacts this causes. There is also a lack of awareness about the sensitivity of these areas related to the water quality of our coastal waters.
Possible Solutions: Both the development and implementation of this proposal will begin to increase community-wide awareness. Connecting with key partners and affected land owners on these issues will also raise awareness.

Lack of Knowledge: Both lack of knowledge about stormwater runoff and what to do about it are significant challenges. Previous solutions included channelizing and lining drainage channels and in some cases either emptying them straight onto the reef or into a lava tube.
Possible Solutions: The outreach identified in this proposal should significantly advance community-wide understanding. Coordinated efforts will also help overcome this challenge. There are examples of vegetation reducing stormwater impacts that can be shared.

Cost and Equipment and Engineering: While many vegetative practices can be implemented at low cost, structural practices require engineering and can have a significant price tag.
Possible Solutions: Vegetative practices can be implemented at much lower costs than engineered practices. Creating buffers and allowing a space for flood corridors to function by avoiding future development in those areas is another low cost option to high price tag engineered structures.

Feral Swine: Feral swine cause significant disturbance in Kona's watersheds and can be a strong driver of soil disturbance and loss of vegetative ground cover in their search for worms. Hunting, trapping and moving animals is a partial solution. Fencing out the animals works best but is cost-prohibitive.

Possible Solutions: Identify landowner opportunities for cost share in state or other programs. Facilitate coordinated or strategic fencing opportunities.

What are the benefits/costs for implementation?

Cost, Benefits, and Tradeoffs

While the cost to producers of implementing stormwater runoff mitigation can be a significant factor, particularly in engineered structural practices are needed. Vegetation-based solutions still have a cost but much less. Benefits are that a significant problem such as gully erosion that may be threatening infrastructure is mitigated which is significant. Also, loss of soil and soil deposition is mitigated, and degradation of reef ecosystems from stormwater runoff are mitigated.

Costs which can be barriers to implementation include: Labor (installation and maintenance of practices); Equipment (mowers, weedwhackers, heavy equipment); and Supplies and Materials (vegetative, structural materials).

Outweighing these factors are the environmental, economic, health, and societal benefits of addressing the stormwater runoff problem which will only continue to get worse if it is not addressed as populations increase and stormwater continues to be diverted without a plan.

What conservation actions/practices/projects are needed to solve the problem?

Conservation Practices

Managing stormwater can be addressed with both vegetative and structural practices. Vegetative practices are the most cost effective as increasing the 'sponge' capability of land cover during heavy rainfall events and minimizing bare soils reduces the peak discharge rates from a storm and thus the necessary size of drainage infrastructure necessary to safely manage the flow. Vegetative practices are essential to addressing the cause of concentrated erosion including conservation cover on agricultural lands and areas, critical area plantings, riparian herbaceous buffers in areas of concentrated flow, and vegetative barriers on steep slopes with sheet flow.

Vegetative Practices:

- Conservation cover
- Critical area plantings
- Riparian forest and herbaceous buffers – Adjacent to waterbodies/drainage channels
- Vegetative barriers
- Tree/Shrub establishment

Structural practices are also important at key erosional points or where water control is needed. For example, an area where a drainage path crosses a road or roadways and impervious surfaces in general may need Infiltration basins to handle increased runoff.

Structural Practices:

- Stream crossings
- Infiltration basins

- Stable outlets
- Lined Waterways
- Grassed waterway
- Rock barriers (need to add to scenarios)
- Water control Structures

Some areas of the watershed have reduced potential to capture and infiltrate due historic grazing uses/land management and also spittle bug damaging those pastures. Silvopasture systems can help restore the hydrologic functions of these landscapes and increase infiltration and capture of precious rainwater resources. Also, managing grazing animals access to sensitive flood corridor is important for water quality.

Silvopasture Practices

- Prescribed Grazing
- Silvopasture (tree planting)
- Supporting practices (Fence -rotation and exclusion from stream and drainage channels; water facilities; pipelines)

Climate-Smart Agriculture and Forestry Practices: Minimizing destructive impacts due to both normal and severe storm events is a key climate adaptation strategy for Kona. This proposal outlines a path forward to minimize degradation of important coastal ecosystems and helps keep carbon and nutrients in the soil and not in the water.

Partner Contributions

Partnership contributions and other funding sources:

Who needs to be involved in making the solution happen (who are the partners in the effort and who will need to participate to make it happen?

Partners who are involved in making the solution happen include:

- **Hawaii County Dept. of Environmental Management?**
- **Hawaii County -Public Works?**
- **Kamehameha Schools ?-**Lots of lessees with erosion issues
- **Kona Community Development Plan Action Committee – Community Planning?**
- **Hawaii State Department of Health Clean Water Branch?**
- **Hawaii DLNR?**
- **Coral Reef Alliance?**
- **Surf Rider?**
- **Kai Kuleana Network?**
- **Hawaii Wai Ola?**
- **FEMA?**
- **Community Land Owners?**
    -

What landowner participation rate is necessary to solve the problem?

Ultimately, we will need a group of landowners along each flood corridor in a watershed to meaningfully address the landscape level problem. However, as a pilot project to increase awareness and test conservation practices in our unique landscape we will only need a few landowners to participate to get the ball rolling and have demonstrations to create further awareness.

We already have inquiries from a dozen or so landowners that are looking for help to solve the gully erosion on their property. For each flood corridor if we were to meaningfully have a handful of landowners participate, it could greatly address the issues for that specific flood corridor.

What role, technical, and financial contribution will each partner bring to the solution?

Describe how partner contributions add value to the proposed project by leveraging and amplifying the benefits of the requested NRCS funding.

How much is the solution going to cost the partnership (and what is the NRCS piece of that)?

Are there letters of support for the proposed project?

Funding Request Summary

Implementation

What additional planning needs to be completed to implement the project(s)?

How much financial assistance, and specifically what practices are needed to complete the project(s)?

An estimated $250,000 is needed to complete the pilot project including implementation of 11 conservation plans funded in years 1 and 2 of a 3 year pilot.

PLAN	ESTIMATE	NUMBER OF PLANS	
VEGETATIVE PLANS ONLY	$8,751.12	5	$43,755.60
STRUCTURAL AND VEGETATIVE PLANS	$23,757.00	3	$71,271.00
PASTURE	$45,246.80	3	$135,740.40
		Total:	**$250,767.00**

In addition $60,000 is requested for 2 years part time funding of a watershed coordinator to:

- Walk/map each floodway within the Kona district to identify problems and opportunities
- Develop a partnership with the County of Hawaii and DLNR to educate the Kona community about our unique floodways and the challenges to prevent flood damage

Total Budget Request

3 water quality monitoring sites for 2 year?	$110,000
11 plans over 2 years of contracting	$250,000
Watershed outreach coordinator (2 years part time @30k per year)	$60,000
Outreach event and workshop/field visit materials	$2,000
Total	**$422,000**

Total budget request for 2 years is $422,000

<u>Implementation Sequence</u>

- Signups will be held each year in FY 2022-2023
- Initial applicant signup will be held in November 2021
- Planning will be done with eligible applicants as soon as possible after prioritization
- Contracts will be obligated as soon as possible after ranking and preapproval in FY 2022
- Implementation of individual contracts will take 1 to 3 years

How much technical assistance and staff time from the NRCS and the partners is needed to implement the project(s)?

The amount of NRCS Staff assistance needed will depend on number of applications received, but will include four Kealakekua Field Office staff (District Conservationist and Soil Conservationists) and KSWCD Soil Conservationist

How and where are projects/practices prioritized and sequenced?

Projects are prioritized by location proximal to areas of concentrated flow. Within 300ft of drainage channel (FEMA mapped or unmapped).

Projects that only require vegetative solutions will be prioritized because of their cost effectiveness.

For projects with structural infrastructure, those will be prioritized by comprehensiveness of solution along the length of the flood corridor:

- % of watershed treated in plan (FA or TA)
- # or % of landowners cooperating in plan (FA or TA)
- Cost effectiveness, vegetative to built structures ratio
- Comprehensiveness of conservation solution, how well treated.

How are the implementation efforts going to be coordinated and managed?

Implementation efforts will be coordinated and managed similar to current EQIP contracts.

What marketing and outreach needs to be done? Is there a plan for the O&M?

Progress Evaluation and Assessment

How will progress towards the goals and objectives be measured?

Progress will be measured by monitoring impacts and effectiveness of installed conservation practices. Metrics could include:

- Tracking brown water events in treated watersheds.
- Tracking area/acres treated/vegetated.
- Installation and monitoring of rain gauges that monitor precipitation fall in targeted watersheds.
- In buffer area, amount of vegetative cover maintained.
- In concentrated flow area, whether concentrated flow problem has been treated.

How will progress be reported, to whom, and how often?

Progress on achieving goals and objectives will be reported annually to the SWCD board, NRCS funders, and SWCD cooperators.

What evaluation of the process will be done so that ineffective efforts can be adjusted?

This is a pilot intended to be used to inform a larger proposal.

What, how, and by whom will on-the-ground projects be monitored?

Clients who implement the conservation practices will be responsible for monitoring on the ground projects and will report/summarize success of practice implementation each year for the life of the contract, to be documented by field staff.

Appendix: XX Contract Examples

Estimate for a ~ 10 acre treatment along flood corridor

Code	Practice	Rate	Extent	unit	Cost for Conservation Practice
601	Vegetative Barrier	$1.21	500	Ft	$605.00
342	Critical Area Planting	$861.44	4	Ac	$3,445.76
390	Riparian Herbaceous Cover	$1,015.09	4	Ac	$4,060.36
412	Grassed Waterway	$0.64	1000	SqFt	$640.00
				TOTAL	**$8,751.12**

Estimate for area with significant concentrated erosion

Code	Practice	Rate	Extent	unit	Cost for Conservation Practice
578	Stream Crossing	$9.64	500	SqFt	$4,820.00
468	Lined Waterway or Outlet	$8.56	1000	SqFt	$8,560.00
638	Water and Sediment Control Basin	$7.20	500	CuYd	$3,600.00
620	Underground Outlet	$22.59	300	Ft	$6,777.00
				TOTAL	**$23,757.00**

Estimate for 20 acre silvopasture and prescribed grazing

Code	Practice	Rate	Extent	unit	Cost for Conservation Practice
381	Silvopasture	$12.37	1000	No	$12,370.00
528	Prescribed Grazing	$52.04	20	Ac	$1,040.80
614	Watering Facility	$6.76	100	Gal	$676.00
516	Livestock Pipeline	$2.77	2000	Lnft	$5,540.00
382	Fence	$12.81	2000	Ft	$25,620.00
				TOTAL	**$45,246.80**

Appendix: XX Notable recent flooding events:

Thanksgiving storm 2020

- Damage reported in North and South Kona

June 19, 2021

- Damage reported in North Kona mauka of Kailua Kona

July 28, 2021

- Damage reported in South Kona near Kealakekua areas

Sept 27, 2021

- Damage reported in South Kona near Kealakekua areas