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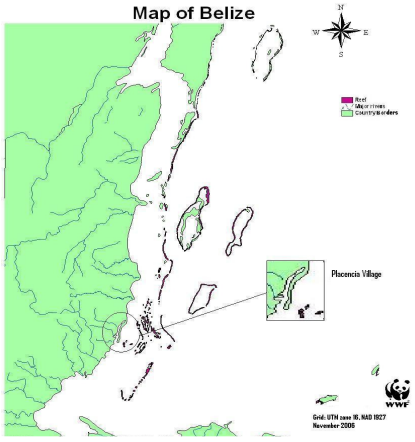
Climate Witness Study within the Mesoamerican Reef

Commenced in early 2006, the World Wildlife Fund's Mesoamerican Reef (MAR) ecoregion's climate change program seeks to assist each MAR nation to better cope and adapt to changing climatic conditions in the face of global climate change. This is particularly important given the high biological diversity of the region and the possibility of impact to national economies dependent on it. Additionally, a significant percentage of the population within each MAR country lives along the coast, which offers the potential for adverse impact to properties and lives linked to associated sea level rise and storm events. The vision, under this program, is to foster the longevity of this biologically healthy and socio-economically important reef region to sustain the socio-cultural factors and livelihood aspects that are dependent upon it.

The impact to people's lives from climate change related events is a reality. Changes in temperature, precipitation, and extreme weather all affect ecosystems, which in turn affect the people dependent on those natural resources for food and other non-consumptive benefits. In recent decades, western science has documented many observed changes in climate and their associated impacts. There is a critical need to put a human face on climate change and disseminate information on its associated impacts on people's lives and livelihoods. Documenting local observations will help raise the level of social and political concern about global warming effects.

An important activity under WWF's climate change program is climate witness studies to gather information on people's perceptions on climate change and how they foresee their lives, livelihoods, and way of life being affected by changing climatic events. One such study was recently completed for Placencia, Belize from late October to early November 2006. This article features some of the major findings of the study.

About Placencia Village:



Placencia is a small coastal village in southern Stann Creek District, Belize. It is situated on the tip of a narrow, 16-mile peninsula that runs parallel to the mainland and bordered by the Caribbean Sea to the east and a lagoon to the west. Although Placencia is part of the mainland, its geography, tropical climate, laid-back culture and white sandy beaches give it the feel of an island.

The lagoon that stretches along Placencia's west coast is fringed with mangroves and occupied by vast sea grass beds, manatees, crocodiles, birds and other wildlife.

Placencia's eastern shore

The world's second largest barrier reef system, the Mesoamerican Barrier Reef, is located just 20 miles off the east coast of Placencia, making it a popular departure point for snorkeling and scuba diving trips. Between the reef and the shore are dozens of small coral

islands, called cayes, which provide ideal habitats for nesting birds and turtles, as well as scuba diving, snorkeling and fishing.

Placencia's weather is hot and humid, with air temperatures averaging 75-80°F (24-27°C) throughout most of the year. Seasons are defined in terms of precipitation, with a rainy season that typically lasts from May to November and a dry season from February to April or May. Rainfall averages about 160 inches per year.

The village is home to approximately 500 permanent residents – who all seem to know each other by name – and a steady stream of tourists. The majority of the people who live in Placencia are Creoles, descendents of European settlers and African slaves, and the main language is English.

The people live modestly and the economy relies heavily on fishing and tourism. Placencia has always been a fishing village, but in the past few decades tourism has taken over as the primary income source for local residents. With increased tourism have come significant changes to Placencia's environment and way of life. Coastal development, pollution and overfishing have become central threats to the environment and the local people who depend upon it.

This climate witness study was aimed at collecting personal stories from Placencia villagers whose livelihood and way of life has been impacted by such human stress factors. By its location, Placencia is a strong candidate in terms of susceptibility to impact from climate change events. Current threat factors are likely to exacerbate in the face of climate change. Through this study, we are empowering them to share their stories first hand to influence critical policies and decision making in relation to developmental/industrial activities and climate change.

Key findings

A number of individuals actively working in the tourism and fishing industries were interviewed during the study. These informants have all witnessed climate change in a variety of ways, including rising temperatures, altered precipitation patterns and coral bleaching. For example, many pointed out that in the past ten years, the rainy season, which used to be May to November, is no longer the rainy season. Storm systems and precipitation have become increasingly severe and unpredictable over time. "Northers," or cold fronts which hit Belize during the winter months, come in shorter spurts and at all times of the year, versus coming in at once and staying for a long period of time. The climate is not as predictable as it used to be.

Coral bleaching is a major issue for Placencia's two most profitable industries, fishing and tourism. Fish are smaller and less plentiful than they used to be, and fishermen are extremely concerned about overfishing by foreign fishermen during the off-season and runoff from nearby shrimp and banana farms. The combination of coral bleaching (and associated coral death) from increased water temperatures and overfishing has greatly depleted fish and lobster crops. Most believe that responsible fisheries management and enforcement of off-season regulation on fishing are needed.

In some areas, locals have witnessed bleached corals making a comeback. In other areas, particularly near the coast or near sediment-producing rivers and nutrient-filled lagoons, corals are dying.

On land, development is the primary issue, causing a significant decrease in trees, bushes and other vegetation. Because there are fewer trees and natural habitats, birds, armadillos and other local animals that were once abundant are now scarce.

In terms of erosion on the mainland, most have observed that erosion occurs north of Placencia. However, due to downward transport of sand from nearby areas, the Placencia peninsula appears to be accreting. Nevertheless during storms and hurricanes, erosion is indeed a problem for the peninsula and is even more of a concern for surrounding cayes and islands, where rising sea levels are having an impact.

Since Placencia is a coastal fishing village, factors such as agriculture, crop yield and drought were not seen as a concern. Increased pests and disease effects were also not a concern.

Edlin Leopold Leslie, Jr., 24
Snorkeling and Fishing Tour Guide and Commercial Fisherman

Edlin Leslie, 24, is the youngest in a long line of fishermen who have lived and worked in Placencia Village for generations. Although he has been a commercial fisherman and snorkeling guide for just six years, has already witnessed changes in precipitation and coral bleaching, brought about by climate change and intensified by human activity.

"Lots of corals are dying. They get big white spots. Also, when the water gets rough, you can see silt settling all over the corals, covering them up and killing them. The rainbow parrot fish are dying off and we are seeing fewer snappers, which are a main fish in Placencia. Also, when people from the north come down and dive for lobster, they break corals to get lobsters out. I think this is the main reason corals are dying in Belize."

Leslie believes the weather patterns are changing.

"Humidity has really increased here, and it gets really foggy so visibility is down. The weather changes suddenly now and it's unpredictable. April and March are usually really windy months, but this past year it was calm. More severe storms came through between 1999 and 2006, including Hurricane Iris in 2001, which destroyed big corals and battered the coastline."

Doren Leslie, 29
Boat Captain and Snorkel Guide

Development, overfishing and climate change are among the primary issues impacting

Placencia's natural environment, according to Doren Leslie. He says that storms are getting "bigger and tougher" and changing weather patterns are impacting his work.

"The weather in general – as I have learned from older fishermen – is much more unpredictable. One month used to be all rain, next thing you know it's hot. You just can't predict what you'll get," said Leslie. "It impacts my work because I cannot plan anything anymore. Everything depends on the weather, and we have to stick closer in to the shore because we never know what the weather will do."

While the Placencia coastline has been naturally building up and getting wider over time, Leslie has noticed a decrease in terrestrial wildlife due to the surge in development.

"Overall, Placencia used to be much denser, but a lot of it has been cut back for development. There used to be more mangos, berries and places for birds to live but now everything is being cleared away."

"Men from Honduras kill anything – they don't care what they take. Lobster trap production is way down because so many people are coming to fish near Placencia. There are fewer dolphins and turtles too. The warming water is impacting the corals right along the beach. They used to look alive and now they are all covered with silt and stuff."

Henry Tucker, 26
Tour Guide and Former Water Operator

As a snorkeling guide around Laughing Bird Caye, Henry Tucker has seen the effects of rising air and water temperatures on coral reefs and fish.

"I think there are more coral bleaching incidents than there were five years ago. Corals and sponges are getting bleached, and in some areas near the surface there is a lot of bleaching. As a result, the corals are dying and the fish go away to new places where the corals are vibrant."

Tucker fears that if the bleaching continues, it could impact tourism and have significant socioeconomic impacts.

"In a few more years, we could see a major down turn in tourism here if this continues. I don't know what I'll do."

Percy Leslie, 60
Fisherman

Percy Leslie, a fisherman for over 30 years, has noticed an increase in air temperature, especially in recent years. The beach has build up a lot over time, but he's not sure why.

"Hurricanes do a lot of damage to mangroves and corals" said Leslie. "The last hurricane in 2001 ripped up the coral and when the tide is low, the top of the coral is exposed and it dies."

Leslie believes the primary problem for the fishing industry is tourism.

"We fish for snapper around the reef and a lot of diving for bull sharks hampers the snapper fish, so the fish are much scarcer than they were before the increase in tourism. Moving scuba diving or doing less scuba diving around the reef would help the corals and the fish."

Mario Torrez, 48
Plant Manager, Placencia Fishermen's Co-op

As plant manager of Placencia Co-op, Mario Torrez is responsible for weighing and inspecting fish to be sold, so he is well aware of the recent slow down in the fishing industry. In addition, Torrez has been personally affected by severe weather that has stormed through Placencia Village in the past few years.

"The weather patterns are all over the place – we get storms out of season. I lost my home due to the wind and flooding from Iris in 2001, so the changing weather has definitely impacted me. I've been rebuilding ever since. Also, erosion is really bad here; the beach is washing away. It's natural change."

Torrez believes that there is a scarcity of important fish crops.

"Fishing is really getting slower here – much less fish now and they are smaller. The crop is decreasing because people come over and fish in Belize from Honduras and Guatemala," says Torrez. "The low numbers of fish are due to over fishing by foreigners more than anything else. It's really hard for fishermen here these days."

If conditions continue, Torrez does not believe the supply can sustain future demands and recommends more regulation on fishing to prevent poaching by foreigners.

Sydney Lopez, 33
Tour Guide and Fisherman, Chairman of Placencia Co-op

Sydney Lopez has noticed the impact of rising water temperatures on the corals; overfishing on the lobster and conch supply; and development on local vegetation and birds. Also, on the lagoon side of the village, where the shrimp farmers are, he has seen a lot of dead fish floating – possibly due to chemicals they are using on that farm.

"I think the sea water has gotten a lot warmer in the past ten years or so. I notice the corals along the coastline are dying off. The dying reefs impact my industry a lot. We have plenty of fish but every year the lobster crop decreases because they like to live in the coral."

"Part of the reason lobsters and conchs are declining is because they fetch a good price and we have more fishermen fishing the same resource. If they don't control it, then it's going to be a problem. We have a problem with foreign fishermen coming into our waters and taking our marine product. If they don't control it, sooner or later, we won't have anything. We can't keep going this way. We depend on the fish for income."

"The mangroves are decreasing due to cutting because of coastal development. People are cutting down the mangroves."

"I think we've lost a lot of trees over the years. You have fewer birds because there are fewer trees for nesting. The birds tend to migrate somewhere else. In general, there are a lot fewer animals in Belize than there used to be. We don't see them during the day – we just see them out in the open, roaming around at night. People are cutting down trees and bushes so there are fewer places for animals to go."

Lincoln Young, 68
Fisherman

Lincoln Young has noticed a significant decrease in wildlife diversity – both on land and in the sea – due to severe weather, inland development and overfishing.

"I see so much dead coral due to severe weather. There is more deep sea fishing because fish look for younger corals and the corals in shallow water near the coast are dying. I would say sea turtles and lobsters are particularly scarce now. In recent years, we have lost mangroves because of stronger storms and hurricanes. We used to have a summer season and now it's rainy. There are more extreme temperatures, such as hotter

winters with much less rain. You just cannot predict rain amounts or temperature for any months now."

Young credits low animal abundance to shortage of food.

"The animal population has decreased a lot over time. We see fewer raccoons because there is no food for them – they used to live on crabs and now there is nothing for them to eat and no where for them to live. We don't see anteaters or armadillos or grey foxes anymore either."

He believes that inland development interrupts fishing and that stronger regulation is needed.

"Flooding is not a problem here, but when parts of the country flood up north, fresh water comes down and mixes with the salt water. The water gets very cloudy and we are seeing a lot more muddy water coming down from the river. Due to inland development along the river and coast, we have a lot more debris washing down into the waters and interrupting fishing."

"I think we really have to monitor the increase in fishermen competing. This needs to be controlled or we will deplete all the fish. Because the fish and conchs are scarcer now, I see people take conchs that are not regulation size and try to pass them off to sell. People are desperate and there is less respect for the marine life now. People need to make a living, but we're all having a harder time at it now."

Sydney Lopez, Sr., 55
Fisherman and Tour Guide

Sydney Lopez's job as a fisherman is much more challenging than it used to be, primarily due to unpredictable weather, warmer water, flooding and erosion in the north. He used to rely on fishing as his only income source but now he guides tours and does carpentry work also. Fishing alone is not enough because the fish are scarce.

"Storms in general, such as big "southwesters" and "northers" have changed a lot. There are lots of flash floods in the north part of the country. It affects us when we go fishing and diving for lobster. Flood water flushes down from the rivers and you really can't see anything."

"The beach front in Placencia Village is building a lot, while the north part of the country and islands are washing away and eroding. Raguana and Hunting Caye built up in the past but now they are almost under water. The water level seems to be rising."

Lopez believes that farm runoff, development and tourism activities are having major impacts on coral and fish.

"Elkhorn and staghorn corals along the coast are dying. I think it has something to do with pesticide runoff from farms and development inland along the rivers, where the banana and shrimp farms are. A lot of trees are coming down, and the rain washes it down with pesticides and sediment."

"I also think the suntan lotion from tourists is killing the corals. There is so much grease and chemicals in the water around tourist areas, and people touch the corals. The lotion kills the protective layer on the corals."

Over fishing and dying corals are having a negative effect on lobsters and conchs, two of Placencia's most profitable marine resources.

"You have to go deep for the conchs now. When I was younger we found conchs in abundance. Now there are too many fishermen. Foreign fishermen are coming in and harvesting babies during closed seasons – during the mating and breeding seasons for these creatures. Outside fisherman will hammer the coral and take lobsters out with eggs. There is no one to patrol or enforce this. The patrols come out right before the season starts. They need to be there when it's the off season. Also, because of the increase in marine reserves, all the fishermen are pushed together in one spot due to marine reserves. So now there is more competition."

Lester Boull, 69
Fisherman

Lester Boull is concerned by the severe decline in fishery conditions over his 40 year career as a fisherman. In recent years, coral and sea life that depend on it have rapidly declined, impacting his livelihood.

"The staghorn corals are not around as much. Shallow water corals – 2-6 ft. of water – are dying off because of the chemicals washing over them. The problems started closer to the mainland, so you can tell that's what's happening."

He says he can be out on the water fishing all day and still catch nothing. He attributed a lot of it to over fishing by neighboring fishermen who come in during the off season and take the lobster and conchs.

"The changes in corals affect the lobster and fish a whole lot. They are much scarcer – especially the lobster because that is the type of coral they like to live in and around. Naturally when they do not have the place they like to live, they don't come around. Cray fish too. You used to be able to predict what you could catch, but now you stay out there all day and still catch nothing."

Boull has also noted a change in biodiversity on land.

The "pien pien," which is a once abundant bird species, is scarcer. He has also noted brown jays disappearing because there are fewer trees and bushes.

"I also don't see silky anteaters like I used to. They used to move slowly around in the trees but now there are fewer trees. I don't know where they went."

Rosenda Aldana, 66
Fisherwoman

Rosenda Aldana is most disturbed by weather changes and their impact on coral and the fishing industry.

"I think the climate is changing a lot. Some months have gotten hotter than they used to be. March, April and May used to be cooler and now they are hot. We also used to have more severe southwesters and northeasters. In years gone by we knew by the clouds that the southwesters were coming. Now, they aren't as long and you can't predict them. The rain has really changed too. We don't have a rainy season anymore. Rain comes anytime – not just in May, June and July anymore."

"The fishing industry has changed a lot because of the change of seasons. Fish have decreased a lot, in part due to the whale shark. The whale sharks kill a lot of fish. Also, the changing weather and "black currents" disturb coral. This change is not really impacting my livelihood, but I worry that younger children won't get to experience it. Also with the elkhorn corals. The long spine back urchin is killing a lot of the corals."

On land, Aldana has noticed that certain species are decreasing, while new species are increasing.

"I do not see animals and birds anymore like I used to in Placencia. It's because of so much population growth here. The jungles are being cleared and the village is so populated now, so all the animals move. We used to see toucans, blue birds and black birds, all the time. The migratory birds seem to skip the area now. Now, we have a big problem with crocodiles in the lagoon. We need to do something about all the crocodiles. We did not used to have those."

Marvin Leslie, 47
Fisherman, Tour Guide and Boat Captain

Marvin Leslie has lived in Placencia Village all his life and – as a fisherman for more then 20 years – he has witnessed climate change and its impacts.

He accounts development as a major issue. "We've had hotter air in recent years, but I think development is having the main impact on trees –

not climate. Right now, we're seeing a big decrease in mangroves due to development. There are more buildings so there are fewer mangroves.

"Right now, we have little vegetation or bushes for animals to inhabit. All the land has been developed. We see fewer gibnuts, armadillos and snakes. Everything is gone…going, going…gone."

"The last major storm was Iris in 2001. Due to changes in climate, when we do have storms they get stronger. Northers aren't like they used to be because of the climate. They used to be a week or two and now they only stay a couple of days. There is change in the timing as well. The cool air is already here but we used to not get it until mid-November."

"The water is getting higher. Human activity cannot raise the water, so we know it's a climate impact."

Leslie believes that marine life is definitely threatened.

"Fisheries are declining. Fewer fish, fewer everything. The resources are not there. We had too many people fishing before. Fish are not effectively protected by the fishing industry. They do not patrol on the off-season. They just patrol the day before open season.

Also, right now we have a lot of rain. A lot of rain causes a lot of floods up north, and floods carry debris out into the sea. There is too much fresh water being flushed in the salt water to sustain the lobsters. They have to go out further for saltier water here they thrive.

Elkhorn and staghorn corals were damaged, but recently I notice that they are coming back in Belize a lot. One thing that is happening is that the shrimp farms and banana farms are flushing in nutrients and causing a lot more algae. This can kill the corals."

Ethel Cabral Jackson, 82
Retired Fisherwoman

Ethel Jackson is a former fisherwoman. She remembers big, abundant fish and colorful corals. Now, she hears reports about bleaching on the radio and from her sons. She is surprised by how small and scarce the fish are.

"The weather has changed a lot. We have no north wind anymore, the weather, in general, is impossible to predict. I would say we have more frequent periods of no rain, but when it does rain, we have more than we used to get in shorter bursts."

She believes that scarce fish means less income for families.

"We also have less marine life, such as turtles. The fish are particularly scarce now. My sons are catching smaller fish these days, and they are really scarce. This has a big economic impact on Placencia. We depend on fish.

It's harder to live on the amount of fish they catch these days. My son tells me stories about it. It's harder to pay bills and support families. The fish are so scarce."

George Eiley, 51
Fisherman

George Eiley has lived in Placencia for 51 years, and he is concerned about the impact rising air and sea temperatures are having on local fisheries, which are already strained by overfishing. Mangroves were destroyed by Hurricane Iris in 2001, but he says they are slowly coming back.

"We have a lot more heat in Placencia these days than when I was young. The water temperature has gotten warmer too. I noticed that all the coconut trees are dying more with the hot weather.

Also, there is a lot of erosion because the tide is higher – both on the mainland and on the cayes. It's going to come back. When the tides go down. The timing of the change of the tide is a little different than it used to be. About one week off."

Fisheries are declining.

"There is a lot of coral bleaching due to warmer water. It is really hard to find the lobster, especially when you have a lot of rain. They go off for deeper water. The warmer water near the coast drives fish and lobster go further out to find cold water and look for living corals. The warmer water is bleaching the corals. It's dying.

Right now, coral bleaching and climate is affecting the fishing industry. Fishing is really decreasing. The fish are getting smaller as it is. There are too many fishermen out there and we can't get as many fish as we used to.

A major problem is overfishing too. We don't have a huge area. We have too many fishermen. Too many people are fishing the same areas. We just can't find fish like before, so it's harder to make a living this way."

Patricia Ramirez, 36
Tour Guide and Dive Instructor

Patricia Ramirez, 36, has lived in Placencia for 16 years and has been guiding scuba diving expeditions off Laughing Bird Caye and other nearby cayes for the past seven years. She witnessed the effect of climate change on the islands and coral, which concerns her because her business depends on healthy coral and thriving marine life.

"Mangroves are decreasing due to all this development and destruction from severe storms. Even if we don't want it, there is not control over development in Belize. We lost most of our vegetation in Placencia when Hurricane Iris hit, but I think it's coming back."

There are also impacts on nearby cayes.

"In some areas, like Laughing Bird and Silk Caye, the islands are changing a lot. We visited Laughing Bird three weeks ago and it was a completely different shape than it was yesterday. It is constantly changing due to weather and currents."

"In Laughing Bird, I see all the corals are totally full of some kind of algae. We can barely see any fish in the dive site area, and there are fewer fish as it is. For some reason, I think they have decreased. We see a lot fewer sharks and turtles. I think it's due to too much fishing – they take them all."

"There is a lot of coral bleaching in the areas where we dive – especially at Laughing Bird. This has a negative impact on my job. It has been this was for the past seven years since I started diving. We need to start educating people about this."

Carlton Wesley, 70
Fisherman and Marine Pilot

Carlton Wesley, 70, can't catch fish like he used to. It's frustrating, and he attributes it to the changing climate and overfishing. He has witnessed many changes in his environment over the past few decades.

"To me, it seems hotter here in recent years and we get fewer storms. The trees get less green. They turn brown more than they used to. When we were younger, there more "biomass".

Also, there are fewer birds due to denser development in the village. No more toucans. We used to see them everywhere and they were beautiful. We do not have cashew or mango trees we used to, and that's what they liked."

Corals are dying and fish is scare.

"A lot of corals seem to be dying and bleaching due to heat. In the past ten years or so we have seen more bleaching than ever before. Fish are getting scarcer too. Most kinds of fish are much harder to catch. You can hardly catch anything these days. I think it has a lot to do with the shrimp trawlers and the netters. The fishing trawlers that are trolling for shrimp catch a ton of fish. They get 10 percent shrimp and the rest are fish. They throw back dead fish. They come from Honduras and do this."

Dave Vernon, 49
Tour Operator and Naturalist

Dave Vernon, 49, sees the impacts of climate change on the local environment through hotter air, increased flooding and more severe storms. Development and aquaculture are impacting marine ecosystems.

"The temperature is definitely getting a bit hotter here. No major changes, but I noticed the dry season was a lot dryer this year – more severe seasons in general. We are getting flooding in areas we never really got flooding before."

Mangrove destruction, erosion and sea levels rise are impacts.

"Destruction of mangroves is a major impact. The Zebos area, with the "Belamia" project underway, is causing a big decrease. Also, there is a problem around the shrimp farms. The sludge that is released includes hormones and all kinds of debris that covers the mangroves and harms them.

Trees are in the water now, where they used to be on land in some areas. The beach is really eroding where Socks Beach is. You can see the immediate change. Someone put a groin in at the beach to stop the sand from moving out. A groin is a concrete structure to hold back the sand. I think it was caused by change in waterway routes. The rivers are getting blocked. People are dredging the river. They are eliminating the free flow of sand that would usually come down and build up the beach. The sea is rising. They are dredging sand for construction and soil. Less sand and more water."

New species are arriving.

"There are different birds coming in that weren't here before. Like the "warblers." I also notice more raccoons and possums ripping up the bins at night. We hear more animals passing through at night."

Coral bleaching and contamination are having an impact.

"We have seen a lot more coral bleaching due to warmer water. Also, there's more siltation from dredging in the lagoon. It covers the sea grass that the manatees eat. It covers the “holofola” species of algae in the lagoon. The manatees like to eat it but now it’s all covered with debris. I also see a lot of upside down jellyfish. I see less crown conch and Murex snails. They are all dead. Maybe due to dredging or contaminants leaching back into the water. Maybe a combination of both.

Years ago, you have an island called False Caye, and there used to be beautiful corals. But the reservoirs of algae are not kept in check so they grow over the corals. Also, they have a significant amount of water being pumped back into the system. New water is introduced into the area three times a day from across the lagoon. It hooks to septic systems and then it is pumped back in. The grasses can only absorb so much and the rest leaches back into the environment. This is causing overgrowth of algae and less coral."

Summary

This article includes only a few of the personal stories collected through the Placencia climate witness study. It includes villagers’ perceptions on ecological and socioeconomic impacts of both climate change and anthropogenic (human-caused) stress factors. Through this effort, we are building a connection with people on the ground to get them talking about these critical issues, and promote advocacy, as a community, to identify strategies to alleviate such adverse effects and increase their resilience to such impacts.

Accreditation

WWF would like to acknowledge the assistance of Catherine Ashby (WWF volunteer, Edelman Co.) for carrying out the surveys and contributing to generation of this article. (Photo credits: Catherine Ashby)

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