Man, Land and Sea

Taotao, Tano and Tasi

Guam Coastal Management Program
Bureau of Statistics and Plans

MAN LAND SEA

a publication by Guam Coastal Management Program

In this issue:

ANGEL HAIR ALGA ON THE RISE

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← *Angel hair algae abundance at the Merizo Pier on August 1, 2015. Photo by Edwin Reyes.*

MAN, LAND and SEA NEWSLETTER

Esther Marie G. Taitague
Editor

BUREAU OF STATISTICS AND PLANS

William M. Castro
Director

James T. McDonald
Deputy Director

GUAM COASTAL MANAGEMENT PROGRAM

Edwin Reyes
Administrator

CONTACT US

P.O. Box 2950
Hagåtña, GU 96932
671.472.4201/2/3

For newsletter information, please contact Esther Marie G. Taitague at 671.475-9671 or email esther.taitague@bsp.guam.gov or Edwin Reyes at edwin.reyes@bsp.guam.gov .

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Message from the Director

Hafa Adai! Improving the quality of living through environmental protection, advocacy, and stewardship is a goal for many states and especially islands like ours. The protection of Guam's natural resources – our lands, rivers, streams, and coral reefs – is essential for healthy marine and terrestrial ecosystems. In this issue, we feature environmental and educational information ranging from simple everyday tips for a healthy watershed to understanding invasive plants that have become a nuisance to our natural resources.

The community also plays a vital role in the protection of Guam's natural resources and without groups such as the Humatak Community Foundation, the Guam Nature Alliance, and civic organizations actively participating in these efforts, our work as government officials positioned in resource management would be difficult.

Also featured are new employees who will be working with the community in managing Guam's natural resources.

Kudos to all environmental stewards who are making a difference for a green Guam and we hope you enjoy this issue.

Si Yu'us Ma'ase,
WILLIAM M. CASTRO

BSP welcomes new director and deputy director

William Castro

William "Wil" Castro is the Director for the Bureau of Statistics and Plans and serves on Governor Calvo's Senior Staff as Special Assistant for Research, Planning and Technology. He currently leads the administration's efforts on developing mobile apps to improve customer service. The Bureau is poised to explore and pursue the establishment of a Guam Research & Planning Data Center.

Wil served in both the public and private sectors. His experiences include having served as the acting Chief Technology Officer for GovGuam; Director, Chief Planner, and educator in a K-12 environment; Director of Institutional Effectiveness and Special Assistant to the President and Chairman in a college setting; senior policy analyst at the Guam Legislature and as General Manager and Webmaster for an e-commerce company. Wil attained doctoral candidacy status at Columbia University and holds a Master's Degree from Harvard University with additional graduate credits from the Massachusetts Institute of Technology.

Wil volunteers over 200 hours a year in combined volunteer service to Guam as a 4th degree Member of the Knights of Columbus (Santa Teresita Council–13373), as Public Affairs Officer and Co-Chairman for the Centennial Committee with the Young Men's League of Guam, and most recently as volunteer I.T. coordinator for the Rigalu Foundation's 2015 'Gift of Love' Telethon.

Wil is engaged to Dr. Debra T. Cabrera, Faculty & Department Chair for Social Sciences at St. John's School and adjunct Faculty at the University of Guam. Together, Wil and Debra raise four children, Ashley (19), Cameren (17), Liam (10), and Mariana Jesusa (5).

James Thomas McDonald

James Thomas McDonald is the new Deputy Director for the Bureau of Statistics and Plans bringing about 34 years of public service to the agency. He currently chairs the Guam Crime Stoppers Program and has served as director for Guam Customs and Quarantine Agency.

James has an Associate of Arts Degree in Criminal Justice and Law Enforcement Administration. He began his career in public service in the late 70's working for Senator Edward Ramirez Duenas and the late Senator Edward McDonald Calvo for two years. He was a staff assistant, handling concerns about the youth and senior citizens and at the same time he attended the University of Guam studying Criminal Justice and Public Administration. He later became a police officer completing the Guam Police Academy's 21st Police Cycle. James later transferred to the Guam Customs and Quarantine Agency where he worked for 21 years and worked his way up from the rank of Lieutenant to the rank of Major. He spearheaded the separation of Customs and Quarantine from Department of Commerce with the assistance of the late Senator Ben Pangelinan and Speaker Joe T. San Agustin. In 2001, James was appointed by then Governor Carl T.C. Gutierrez to serve as Director of Guam Customs and Quarantine and later retired in September 2003.

James has an extensive knowledge in homeland security. In January 2013, he attended the Naval Postgraduate School Center for Homeland Defense and Security in Hilo Hawaii as well as the United States Department of Defense (DOD) exercises in the Pacific Area Command Headquarters (PACOM) in Honolulu Hawaii. In 2011, he was appointed by Governor Eddie Baza Calvo to serve as the Guam Homeland Security Advisor. James was also appointed to be the Mariana Regional Fusion Center Director. James was instrumental in making sure that our All Hazard Warning System (siren) be a priority for all hazards and threats. In late January 2013, the MRFC received recognition from the US Department of Homeland Security as the 78th Fusion Center of the United States. James also attended New Mexico Tech Executive Managers Training in Socorro New Mexico for Incident Response to Terrorist Bombing and Suicide Bombing. ➔

New faces in the BSP Family

he Bureau of Statistics nd Plans is delighted o welcome five new mployees to the team! ina Mafnas, Christian aul Benitez, Esther Marie amacho, Anna Simeon, nd Andrea Hersberger.

Tina E. Mafnas graduated from the University of Guam with a bachelor of science in Public Administration in 1998. She was previously e Program Manager at the Guam ıergy Office. Since Tina started ith GEO in 2009, she started up ıd managed the Weatherization ıistance Program for Low-income ersons that serviced close to 1,000 ents which continues to provide ıergy measures for homes. Through r years with GEO, she acquired a ıckground on grants and project anagement and learned an exten- ve amount on energy savings and ıergy conservation. Tina is excited join BSP in her new capacity as a anner III and she will be one of the presentatives for BSP in the Appli- tion Review Committee (ARC) for all nd use development and seashore earance applications. Tina has been long time resident of Talofofo and r favorite pastime is spending time th her family and baking.

Joining the Socio-Economic Planning Program is Christian Paul Benitez as a Planner I. He is a recent graduate from the University of Guam with a degree in Business Administration with a concentration in Entrepreneurship. Christian is learning the ropes under Planning Supervisor Lola Leon Guerrero and Senior Planner Millie Erguiza. "I am still learning a lot about my role here as a planner, but I'm grateful to have a job that broadens my perspective of the state of our island and to learn about how our community comes together to achieve our goals." Outside of work, Christian enjoys going to the beach to snorkel or skim board, skateboarding at the skate park, and cleaning or cruising in his Nissan 370z.

Esther Marie Masga Camacho is a 2012 graduate from the University of Guam with a bachelor's degree in Business Administration with a Concentration in Finance & Economics. She currently holds a position as a Planner I at Bureau of Statistics & Plans with Planning Information Program. She is tasked to assist with the annual Guam Statistical Yearbook, Guam's Facts & Figures, Quarterly Planners Bookshelf and reporting for the Impact of the Compacts of Free Association on Guam under the supervision of Monica Guerrero. She is a member of the Non-Communicable Diseases Control Program of the Action Surveillance Team. She hopes to help strengthen the data collection and assist in monitoring the community's health improvement in Guam. During her leisure time, she enjoys a day at the beach spending quality time with her three children. She is an enthusiastic paddler in the Achagigu team under the Outrigger Guam Canoe Club.

Anna Simeon graduated from the University of California, San Diego in 2009 with a degree in Environmental Systems focusing on ecology, behavior, and evolution. After earning her degree, she worked as a research assistant on the Caribbean island of Curaçao studying the effects of contaminated groundwater runoff on reef communities before moving to Guam in 2011. Anna is currently pursuing her MS in biology from the University of Guam's Marine Lab, which she will finish this semester. Her work there took her throughout Micronesia to study and document the region's marine plants, the results of which helped inform the recently-published Micronesian Biosecurity Plan about Guam's risk of marine invasive species. As a biologist, Anna brings a wealth of diverse experience to BSP's Watershed Coordinator position. She is excited to help manage Guam's watersheds and resources through restoration efforts and public outreach. In her free time Anna is an avid outdoorswoman spending countless days paddling, diving, hiking, and sailing. She also performs frequently in theatrical and musical productions around the island.

Andrea J. Hershberger moved to Guam in 2007, where she worked as an Aquarist at UnderWater World. Taking care of the fish and animals in the aquarium enhanced her passion and love for the oceans and all marine life. In 2011 she began studying at the University of Guam towards a Masters Degree in Biology from the Marine Lab, focusing on fisheries management. Her desire to protect and preserve marine life, as well as her love for Guam's reefs and marine life, grew much stronger. As the new Reef Resilience Coordinator, she will be leading the development of Guam's Reef Resilience strategy to address impacts form coral bleaching, coral disease, ship groundings and other threats to Guam's reefs. She will be coordinating the Response Team to address these types of disturbances. She will also be conducting education and outreach related to reef resilience.

Andrea loves outdoor activities – both in and out of the water – she is an avid scuba diver and a member of the Guam Women's Beach Volleyball National Team. She is also a yoga instructor, and has been teaching yoga at Synergy Studio Guam since 2008. ▲

(Deputy director continued)

James is currently serving as a ember of the Maritime Domain vareness Taskforce, the Area Mari- ne Executive Committee, Joint rrorism Task Force, Emergency edical Services Commission, the Oceania Regional Response team, Task Force and Mass Care and Emergency Assistance, and Peace Officers Security Training (POST) Commission. He is also serving as the Vice Chair for the Port Readiness Committee, a member for the Invasive Species Council and an active member of Guam's Catholic Parish.

James is married to Mrs. Sallie Lorraine Toves McDonald and they have two lovely children, Mia-Ashlee Elizabeth Toves McDonald who is attending Our Lady of the Lake in San Antonio Texas on her last semester, Majoring in Criminal Justice. Michael James Charles Toves McDonald is a freshmen attending George Washington High School and is a member of the ROTC armed drill team and the US Naval Sea Cadet Program. James' brother, Paul McDonald is the current mayor of the beautiful village of Agana Heights. ▲

Toguan Watershed: The Bridge to Preservation

One of many mini-falls in the Toguan River is shown above.

We all live in a watershed! Watersheds come in all shapes and sizes and even cross villages or state boundaries. Watersheds have natural boarders separated by their high points of their upper boundaries.

Unfortunately, activities such as fires, deforestation, agriculture, development, natural disasters, and invasive species have altered the natural flow of watersheds, putting natural resources at risk. By preserving and maintaining healthy watersheds, we can protect the health of our island and its people.

Bridging conservation efforts along the southern villages will help restore landscape connectivity and natural flow that is essential in maintaining healthy environments. The Toguan watershed makes a unique conservation bridge to tie-in ongoing studies and work conducted in its two neighboring watersheds.

The Toguan watershed is located within the Southern villages of Umatac and Merizo and is between the Umatac and Geus watersheds. Landmark demarcations begin at Mamatgun Point and go through Jesus Quinata Court and Jesus Quidachay Street in Umatac and go up into the hills at the edge of Mt.Schroeder and wraps down pass Dometro Meno Street and ends at the Merizo Catholic Cemetery. The Toguan watershed is 903 acres with the highest elevation at about 1043 feet (318 meters) in the eastern boundary of the watershed at the edge of Mt.Schroeder. The total perimeter is 4.1 miles. The watershed is ➔

10 Tips for a Healthy Watershed and Healthy Environment

STOP FIRES. Forest fires greatly deteriorate watershed quality by contributing to loss of vegetation (especially native species), flooding, erosion, destruction to coral reefs, and threaten fish stocks.

PLANT NATIVE TREES. A healthy forest canopy can reduce storm water runoff by as much as 7% in a neighborhood, according to American Forests (1999).

START COMPOSTING. Yard, recyclables, or food waste composting is a green alternative to burning at home. Composting offers economic benefits to homeowners by enriching poor soils and reducing the need for water, fertilizers, and pesticides for home landscaping. Composting can also aid as erosion deterrent and can prevent pollution in stormwater runoff. Be sure to cover your compost with the UOG approved Rhino Beetle net to trap and stop the spread of this invasive species.

Volunteers spend their Saturday picking up trash and marine debris along the coast and roads of Umatac

LANDSCAPE WITH NATIVE PLANTS. Landscaping is not only attractive for your home and helps increase the value of your property, it also absorbs heat and helps reduce pollution of groundwater. Natural landscaping creates a natural seed bank of native plant species in watersheds; and can prevent the spread of invasive non-native plant species.

REDUCE, REUSE, RECYCLE. The less you consume or purchase the less waste you create. If you must buy an item reuse the item as much as possible. Recycle, please visit Guam Environmental Protection Agency's website at http://epa.guam.gov/activities/recycling-guide to see the most recent recycle guide. ➔

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mprised of diverse vegeta-
n such as badlands, savanna,
ub forest, ravine forest, and so
th. There are three main rivers:
guan, Bile, and Pigua.

Traditional activities still occur
:h as fishing in the Toguan and
e Bays, shrimping in the rivers,
d hunting for deer and pigs.
ditionally, recreational activi-
s are prevalent such as diving,
imming, and hiking. A popular
:e is to Priest Pools which is in
erizo and a part of the Pigua
er. Priest Pools are naturally
med basalt lava-rock forma-
ns with several pockets that
filled by freshwater creating
eral pools.

Toguan watershed is home
native animals such as the
dangered Mariana Common
orhen (Gallinula chloropus
mi) which are known to use
wetland and river habitats
the Toguan River and bay
a. Endangered hawksbill sea
tle (Eretmochelys imbricate)
d threatened green sea turtle
elonia mydas) have been
cumented to use the beaches
rth of Umatac, and both sea
tles may nest or forage in the
guan Bay and Bile Bay area as
ll. Other large sea creatures
cumented on both bays are:
arks, Dolphins, Manta Rays,
d Whales.

Toguan similar to the rest of
watersheds on the island face
ues of concern such as invasive
ecies, pollution and degrading
:ural resources. Toguan is just
e of the many watersheds that
in the process of revitalizing
health of our island through
ridge to reef approach study
d application.

GCMP's work in Toguan will be
mmarized in a watershed char-
erization study expected to
completed in April 2015 and
be shared with the mayors
Merizo and Umatac, natu-
resources partners, and the
mmunity. ▲

Tips for a Healthy Watershed

POLLUTION PREVENTION. Preventing pollution in our communities is much easier and cost effective than cleaning it up. Never put grease, fats, or oils (FOG) down the drain. However, as trash is prevalent on island, cleanups are necessary and rewarding for both the participant and our island. Participating in community cleanup events can provide an easy way to get involved.

MAINTAIN SEPTIC SYSTEMS. For homes that rely on septic systems for sewage disposal: Regularly inspect and maintain septic systems, make repairs as needed, and prevent disposal of household chemicals through the leach field. The accepted practice is to inspect the tank and leach field once every two years to make sure it is working properly, and to pump out the tank.

REDUCE FERTILIZER AND PESTICIDE USE. Practice natural lawn care by using low inputs or slow release fertilizers and safer chemical pesticides. Use proper timing and targeted application methods.

DO NOT RELEASE PETS INTO THE WILD. Guam has a high number of feral animals such as dogs, cats, pigs, and deer which have caused native flora and fauna loss and has contributed to the extinction of some species.

BUILD IN ACCORDANCE WITH LOCAL ORDINANCES. To help maintain water quality, follow local building codes from Guam's permitting agencies, ensure the development is inline with the guidance from the North and Central Land use Plan, and follow GCMP's storm water design specifications for new projects. ▲

TOGUAN CLEANUP TOP THREE COLLECTED TRASH

Item	Total	Total Percentage
Beverage Cans	184	27.75%
Plastic Bags	109	16.44%
Cigarette Butts	78	11.76%
	371	**55.95%**

Above: Twenty-five volunteers participated in keeping their watershed beautiful. The Toguan Watershed Cleanup was conducted on Saturday, February 7th in coordination with the Bureau of Statistics and Plans and the Humatak Community Foundation (HCF). The HCF is an outstanding community partner and leader in the village of Umatac, educating young children to young adults about their heritage and guiding them to be a proactive member in the community. Volunteers also participated in data collection on the types of trash collected at the cleanup. Beverage cans were the majority of trash collected followed by plastic bags, and cigarette butts. This data is comparable to the trash collected during in the annual International Coastal Cleanup.

Over the last three years extensive outbreaks of angel hair algae have affected large stretches of Guam's southeastern shores as evidenced by dense algal strands smothering reef flats and piles of dislodged beach-cast algae.

Thick piles of dislodged angel hair algae lining the eastern shores of Cocos Island (June 4, 2014). Photo courtesy of Tom Schils.

Restyling Guam's Reef Flats:

Angel Hair Alga on the Rise

By Tom Schils
Marine Laboratory and Sea Grant Program, University of Guam

These green algal blooms have altered the biological composition of reef flats, clog up fishing nets and affect recreational beach use. The spatial extent of these blooms along Guam's shoreline has expanded from a localized event in Pago Bay in 2012 to a phenomenon that now impacts about one-fourth of the island's coastline. The bloom, however, has not ceased to spread and recently the alga has intruded Guam's western shores. In addition to its increasing spatial footprint, the growth season of the angel hair alga has been extended and it now occurs year-round in Guam's nearshore waters. Although natural bloom and bust events are common in the marine environment (e.g., seasonal or interannual variation in population density, sometimes in response to major disturbance events like typhoons and volcanic eruptions), the observed trend of an increased and more persistent algal cover for three successive years is very unusual and causes concern among resource users, reef managers and scientists.

Which Hairdo?

Given the prominent presence of these bright green tides for the past three years, it is remarkable that the angel hair alga went practically unnoticed for decades. Fishermen claim that before 2012 they had never seen this alga for at least three generations. Such anecdotes are consistent with the available scientific observations. Monitoring surveys, impact assessments and taxonomic collections are void of records of the angel hair alga. The only available archived records of a similar looking alga from Guam date back to the early summer of 1968, when several specimens of the angel hair alga from different collectors were deposited in the University of Guam Herbarium.

On one of these herbarium sheets, Dr. Roy Tsuda – the then resident marine botanist in Guam – noted that the angel hair alga was abundant in a single locality. When inquired about this collection, Dr. Tsuda vividly recalled discovering these specimens as they represented the largest and longest angel hair algae he had ever encountered. The only algal stand observed in 1968 measured about nine square meters, which is an order of magnitude less than the acres of reef flat habitat the angel hair alga covered during the peak of its growth season in 2014.

Other sightings of angel hair algae were reported during a Marine Botany field trip in 2005 but the general habit and cell size measurements differ from the alga that currently proliferates on Guam's reef flats. Thus, historical records suggest that an angel hair alga look-alike previously occurred in Guam but at much lower population densities than those currently witnessed. The attentive reader will have noticed that in the above section, the bloom-forming alga was only identified by its colloquial name and that an accurate and unique scientific species name is not provided. Analogous to the rapid turnover of pop divas and their coiffure in the music scene, the scientific naming of algae is currently in a state of flux as the biological (genetic) diversity exceeds the amount of available (described) species names.

This is particularly relevant for the angel hair alga, a member of ➔

(Continued from previous page)

e green algal genus Chaetomor-
ıa, which exhibits few morpho-
gical features (i.e., characters that
escribe the shape, form or struc-
ıre of an organism) to adequately
entify all its species.

Until recently, many Chaeto-
orphas from the tropical Indo-
acific were identified to be species
escribed from temperate Europe.
enetic studies have since demon-
rated that angel hair algae from
e Indo-Pacific are composed of a
ımber of species, all distinctly differ-
ıt from their Atlantic counterparts.
To better understand the sudden
een algal blooms in Guam it is
ıperative to obtain an accurate
ıecies identification of the angel
ıir alga that causes these blooms
ıd to compare its genetic code with
ıose of past collections from Guam
ıd other Micronesian islands.

If genetically different from the
e-2012 collections, the
ooms could represent a
cently introduced alga
at is colonizing newly
ailable habitats. The
opical Pacific is replete
ith textbook examples
similar algal invasions.
ır example, the red alga
canthophora spicifera
rived in Pearl Harbor in
e early 1950's as a stow-
vay on a heavily fouled
ırge originating from
uam. Now, Acanthophora
ıicifera has become the
ost abundant alien alga
the Hawaiian Islands
splacing native algae.

If the bloom-forming
ıaetomorpha is inva-
ve to Guam, compara-
ve genetic analysis with
mples from through-
ıt the Indo-Pacific could
ovide a clue on the
ga's geographic origin.
ınversely, if the bloom-
rming Chaetomorpha
a Micronesian native
that previously occurred in Guam, other hypotheses to understand and manage these blooms should be explored. Eutrophication (elevated nutrient input) is generally the first culprit accused of triggering algal blooms but the areas affected by the angel hair alga are distant from terrestrial sources of nutrient input and represent some of the most pristine reefs in Guam. Changes in other environmental conditions, however, could be responsible for the Chaetomorpha outbreaks. In the last years, the Mariana Islands have experienced periods of unusually high seawater temperatures as evidenced by a very complete archive of high-resolution satellite imagery. These incidences of thermal stress have resulted in the worst coral bleaching events ever recorded for Guam.

Go Green, Eat Green!

Unsupported alarmist outcries over unusual biological events do not benefit the island community. The abrupt nature of the persistent algal outbreaks and the large geographical scale over which they occur, however, warrant a cautious approach and should stimulate partnerships between resource users, agencies and researchers to evaluate the impact on Guam's natural resources and—if required—propose solutions to mitigate problems. After all, past invasion events in Guam have demonstrated that early intervention is key to successful and cost-effective conservation, management and restoration actions. The scientific literature is riddled with examples on how invasive algae can drastically alter reef scapes (e.g., phase shifts to algal-dominated reefs), hereby outcompeting reef building organisms, changing fish communities, and reducing fisheries production. To date, none of such effects have been investigated for the green tides in Guam. Anecdotal observations of interactions with other reef organisms suggest that the angel hair alga's chemical defense against herbivory is limited as rabbit fish recruits (mañåhak) feast on the alga (Fig. 2). Fishermen have been first to apply such observational knowledge to adapt to the changing reef environment and created a new Guam delicacy: crunchy angel hair salads topped with celebrated fina'denne' mixes. That said, binge salad-eating will probably not make a dent in the algal cover on reefs. A basic understanding of the alga's seasonal population dynamics and an accurate assessment of its spatial coverage, however, could support site-specific eradication strategies at times when Chaetomorpha biomass is naturally low. Only time will tell if Guam is currently experiencing an ecological anomaly or if rapid response actions by natural resource managers were effective in stalling the transformation of our biodiverse reef flats to evergreen reef moats. ▲

Rabbitfish feeding on the angel hair alga in Pago Bay (May 8, 2013). Photo courtesy of Tom Schils.

Fish, Fish, and more Fish

By Jane Dia

Guam needs more fish. Phase 1 (2012-2014) of The "Piti Pride Tepungan Wide" Campaign brings together fishers, residents, businesses, and resource users to improve fisheries management in the Piti Bomb Holes Preserve, which is one of five marine preserves on Guam, located in the Tepungan Bay, where near shore fisheries was a way of life not too long ago.

The total area is "Tepungan Wide" which begins from Camel Rock at Asan Point and ending at Piti Channel before the Piti Canal. The target audience were local fishers and all resource users of the Bomb Holes Preserve because they are part of the solution to the main threat to the fish habitat which are others damaging fish habitat by unauthorized removal of animals and purposely walking through sea grass beds. Piti Bomb Holes Preserve needed a Pride Campaign to begin conversations about fishery management and how to empower the community to protect fish habitat. Two main behavioral change objectives of the campaign were to increase participation in marine preserve activities and to use the new text line number 688-3297(DAWR) for reporting impacts to the preserve.

With an increase in conversations regarding benefits of marine preserve activities, behavior was expected to change by more people becoming involved in marine preserve's management. After the end of Phase 1, biological data will be collected to monitor the conservation target, which is the fisheries habitat, with hopes of maintaining the health of its ecosystem to fulfill the purpose of a marine preserve. Through the use of the text line, the campaign has successfully implemented a way to reduce obstacles for people to participate in marine preserve activities. The text line, also referred to as the "Pride Line" was most successfully marketed on screen cleaners for people to stick on their phones to have the number readily available.

A key partner of the campaign was the Fish Eye Marine Park; by allowing Piti Pride training to their staff, collaboration with their security guard, offer to host a fisher lunch recognition, offer for free admission for school children for Piti Pride campaign, and continual support throughout the campaign by communication, meetings, and sharing of ideas to protect the preserve. Post survey data showed an increase of fishers who have discussed with others about participating in marine preserves and an increase of fishers who have thought about helping in marine preserves. At the end of the campaign, a spear fisher group expressed interest in forming a community-based monitoring group for Phase 2 Pride for Micronesia Campaign. Through their experience in the community-based monitoring group on Guam, hopes are to have them present to the other campaigns in Micronesia to share best practices. ▲

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a publication by Guam Coastal Management Program

Cleaning Guam's Coasts for 20 Years

On Saturday, September 20, 2014 the largest cleanup took place on island and around the World— The International Coastal Cleanup! The event is sponsored by the Ocean of Conservancy which started in 1986. "For the past 28 years, Ocean Conservancy has inspired millions of volunteers, as well as industry players, the world over to take action by removing and recording trash during our International Coastal Cleanup. This event has been one of Ocean Conservancy's hallmarks, growing from 12 sites along the Texas coast to more than 6,000 sites in more than 100 countries."(Ocean Conservancy)

Though the International Coastal Cleanup event has been around for 28 years, this year was Guam's 20th annual participation. This all started when a concerned Coast Guard approached BSP's Public Information Officer Dave Duenas and asked how Guam can participate in this worldwide event. That conversation by two concerned citizens paved the road for a cleaner and more aware Guam!

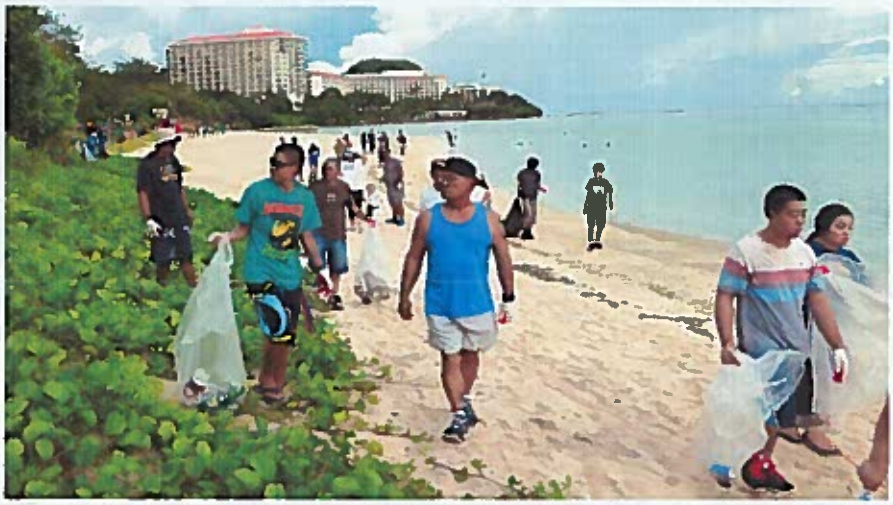
This yearly event is a whole island effort voluntarily led by BSP and comprised with volunteers from federal agencies, Government of Guam agencies, corporate sponsors, private, civil, and military organizations, and of course, the many individual volunteers who allow this event to be such a success on our island.

In addition to beautifying our island and protecting our environment the cleanup provides a unique opportunity to collect information on specific types of trash and sends the report to the Ocean Conservancy in Washington D.C. whereby the data is published by geographic location and used for environmental studies.

According to data compiled by last year's Coastal Cleanup, 81,413 pieces of trash were collected or a total of 1,855 trash bags filled up! This year the landfill received 11.34 tons or 22, 680 pounds of trash! Recyclable items found like aluminum cans were routed to the appropriate recycling facilities.

This year this charitable event hosted 23 sites including an ocean dive site in Asan conducted by Eric McClure from Micronesian Divers Association, one of the many businesses that have supported and continue to support the clean up.

Shout out to the thousands of volunteers and partners who participated in this event!



Group of students waiting for assigned area to pick trash.

2013 TOP THREE COLLECTED TRASH

Item	Total	Total Percentage
Aluminum Cans	15,313	18.81%
Cigarette Trash	13,206	16.22%
Plastic Bottles	8,648	10.62%
	37,167	45.65%

Partners include: Governor and Lt. Governor's Office, Guam Department of Parks & Recreation, Department of Public Works, Guam EPA, Mayor's Offices of Agana, Agat, Asan, Chalan Pago, Dededo,

■ continued on page 4

INSIDE

■ GCMP has moved!
777 Route 4, Suite 5A,
Phase II Complex Sinajana,
Guam 96910

Message from the Director

Hafa Adai!

As a customary practice of the Bureau's coastal program newsletter, we are featuring stories about our island's natural resource activities as they play a major role supporting the physical and economic health where we live, work and play. As our island continues to prosper and adapt to changing times, we all need to be proactive as environmental stewards and take pride in keeping our island clean, green, and a home for future generations. Additionally, we like to introduce our new members to the BSP family as they step into the shoes of those retirees with 30 plus years in Government of Guam now moving to a new chapter of their lives whether that be working part time in the private sector to obtain social security benefits, working on the Honey-Do list, or traveling abroad. We hope you enjoy this issue.

Si Yu'os Ma'ase,
LORILEE T.
CRISOSTOMO

Digital Atlas Mapping of Northern Guam

A Memorandum of Understanding was entered between BSP and University of Guam, Water and Environmental Resource Institute (WERI) utilizing NOAA Coastal Zone Management dollars to assist with the development of a Digital Atlas for Northern Guam to serve as a reference tool that provides snapshots of the natural resources, environment, and man-made features found in the northern half of Guam. The Atlas is accessed via a dedicated domain name, www.hydroguam.net that offers a wide range of information to raise awareness of northern Guam for sustainable management of coastal zone, near shore, groundwater, and terrestrial resources. This online digital atlas serves as a data repository and information server to provide public access to geospatial and other information about northern Guam including text, maps, GIS files, photographs and various forms of data. For more information on the hydroguam domain, call WERI Hydrologist at 735-2693.

CNMI and Guam Share Ideas on Land Use Management

A learning exchange forum between CNMI and Guam officials was recently held at the Guam Hilton Resort on August 26, 2014. The Bureau of Statistics and Plans and its network partners shared valuable information on land use management and natural resources protection with CNMI representatives from Division of Coastal Resources Management, Bureau of Environmental and Coastal Quality and board members.

The CNMI group was very excited to learn about Guam's coastal programs including permitting, enforcement, and federal consistency projects. The main difference between Guam Coastal Management Program (GCMP) and CNMI Division of Coastal Resources Management is that GCMP does not have enforcement authority on the conditions placed on proposed projects. GCMP is a network program as authorized by the U.S. Coastal Management Act to collaborate with its partners to enforce natural resources protection and land use management. GCMP works closely with Guam EPA to enforce the Clean Water Act through erosion and sediment control practices; with State Historic Preservation Office for preservation of historic resources and artifacts; with Department of Agriculture for preservation of native plant and animal species; and with Department of Public Works (DPW) to ensure that building codes and its other mandates are enforced.

Terry Perez, Guam coastal zone planner and BSP's representative in the Application Review Committee (ARC) presented the functions of the committee to the Guam Land Use Commission (GLUC) development activities that do not meet zoning codes. Department of Land Management (DLM) director Michael Borja discussed the department's role in the ARC and GLUC process and his role in rendering a decision on summary zone change applications.

CNMI team and Guam counterparts pose for a group photo at Alupang Beach during a recent visit to observe marine sports management.

Guam representative Mike Cura from the Department of Parks and Recreation briefed the CNMI group of the Recreational Water Use Management Plan to insure the safety and general rights of the general public while providing for the maximum amount of environmentally friendly and sustainable public access to the ocean shore and its marine resources.

A field trip to some of Guam's development projects and marine sport sites were also a part of the exchange forum. The group visited Alupang Towers to observe marine sports recreation and how the Recreational Water Use Management plan has been applied. Marvin Aguilar, Guam Chief Planner and ARC Chairman with DLM provided in sight on the ARC process of the Emerald Towers proposed project that has

Coral Task Force Meeting Held in Pacific

Hawaii - Guam's Point of Contact for Coral Reef, BSP Director Lorilee Crisostomo, along with Ed Reyes, Coastal Program Administrator, and Jessica Toft, Assistant Attorney General of Guam, met with Eileen Sobeck, Assistant Administrator for NOAA Fisheries and Co-Chair of Task Force, at the 32nd Coral Reef Task Force meeting held in Maui, Hawaii on September 8-12, 2014. Types of corals recently categorized as "threatened" under the Endangered Species Act, managing construction stormwater impacts, and ocean acidification were couple of the highlights addressed at the meeting.

GCMP of BSP and Navy continue Phase Approach for Relocation

The Bureau of Statistics and Plans (BSP) continues its efforts to preserve Guam's coastal resources while working with the Department of Defense (DOD) to provide a smooth transition and support for the proposed military build-up in Guam.

Since the announcement of the probable relocation of U.S. Marines from Okinawa, Japan to Guam, the BSP has striven to coordinate with the DOD to ensure that Guam's natural resources are protected while providing governmental cooperation and assistance for the proposed build-up. Previously, on May 28, 2010, the BSP completed its review of DOD's April 2010 Federal Consistency Determination (FCD) for the "Guam and Commonwealth of the Northern Mariana Islands Military Relocation, Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing and Army Air and Missile Defense Task Force", hereinafter referred to as the Relocation Plan, which was initially submitted to the BSP for federal consistency review. After thoroughly evaluating the FCD and Draft Environmental Impact Statement (DEIS) upon which it was based, the BSP found that the Relocation Plan was not consistent with the enforceable policies of the Guam Coastal Management Program (GCMP), nor was the FCD in compliance with the Federal Consistency Regulations under 15 C.F.R. Part 930. The GCMP then objected to the Relocation Plan as proposed.

Albert Blas of Naval Facilities Engineering Command Marianas, Dept of Navy, briefs representatives from Department of Agriculture, Guam EPA, BSP, and other agencies of the proposed sites for the main cantonment stated in the DSEIS for the upcoming Marine Corps Relocation.

On June of 2014, DOD worked together with the Government of Guam and submitted new federal consistency documents for the BSP's review. The Relocation Plan contained more specific information on the Draft Supplemental Environmental Impact Statement (DSEIS) and newly submitted Negative Determination (ND) for the Relocation Plan to be reviewed. However, the BSP did not find the Relocation Plan to be entirely consistent with the enforceable policies of the GCMP, nor was the ND in compliance with the Federal Consistency Regulations under 15 C.F.R. Part 930. In particular, the DSEIS proposed the construction of a brand new housing site proposed to be located at in Finegayan, near Haputo, also known as "Alternative A." The construction of this new housing at "Alternative A" would have required the clearing of approximately 400 acres of mature limestone forest, as well as the drilling of multiple new wells into the Northern Aquifer to provide infrastructure for the new housing. The ND submitted by DOD found that this drilling would have no foreseeable impact on Guam's natural resources.

Under the GCMP, the BSP conditionally concurred with other projects proposed in the DSEIS which would make improvements to already existing structures but disagreed to DOD's determination that its proposal to drill multiple new wells into the Northern Aquifer to support the housing located at "Alternative A" would have no foreseeable effect on Guam's natural resources. In response, DOD proposed a new housing option, tentatively labeled "Alternative E." Thus far reported, "Alternative E" is a proposal to improve and renovate existing and currently unoccupied housing located on Andersen Air Force Base. This proposed housing purportedly already has existing infrastructure, and would not require the clearing of large amounts of ground cover or forest. The BSP is currently awaiting confirmed written documentation regarding the "Alternative E" proposal, in compliance with the National Environmental Policy Act, for its review and comments.

The BSP would like to thank the Department of Navy, Joint Region Marianas for its commendable cooperation to BSP and its network resource agencies during the review of the DSEIS and to continue the phase approach of the proposed activities in relation to the Relocation Plan of the Marines.

■ continued from page 1

Inarajan, Mangilao, Merizo, Piti, Talofofo, Tamuning/Tumon, Umatac, and Yona. Other partners include Underwater World, Sea Grill Restaurant, Fisheye Marine Park, I-Recycle, Tristar, Trivision Media, Coast360 Federal Credit Union, TASI, Guam Hawgs, Guam Association of Realtors, Lagu Sanitation, Guahan Waste/Mr. Rubbishman, Trash Co./ Morrico Equipment, Pacific Waste Systems, Gershman, Brickner & Bratton, Pyramid Recycling,Mobil Guam, Best Water & Ice, Micronesian Divers Association, Pacific Daily News, Hit Radio 100, K57, Isla63, Island Beautification Task Force, Guam Girl Scouts, Eco- Warriors, Marine Mania, Guam Community College, University of Guam, Guam EPA, Water Environmental Research Institute (WERI), National Oceanic and Atmospheric Administration (NOAA), War in the Pacific National Historical Park, United States Coast Guard, Anderson Air Force Base, and U.S. Navy.

Volunteers signing up for Clean Up

ICC 2014 Sites

Adelup Shore
Agat Shore
Asan Cut Dive Site
Asan Shore
Dungca's Beach
Inarajan Bay
Ipan Beach
Marbo Cave
Marine Lab Coast
Matapang Beach
Merizo Shore
Oka Point
Okkodo Pipeline
Pago Bay
Paicppouc Cove
Paseo Shore
Piti Shore
Taga'chang Beach
Talofofo Bay
Tanguisson
Tarague Beach
Umatac Shore
Ypao Beach

BSP Welcomes New Staff

The Bureau of Statistics and Plans (BSP) welcomes new employees Edwin Reyes, Jesse Rojas, Brenda Atalig, Estella Tapia, and Jessica Toft.


Edwin "Ed" Reyes

Edwin "Ed" Reyes joins BSP as the Guam Coastal Program Administrator. He earned his degree in Business Administration with a focus in Management in 1997 and later obtained an M.B.A. in Management in 2013 from the University of Guam.

Edwin brings an extensive background in grants and project management to GCMP earning processional certificates from the National Grant Writers Association and National Center for Construction Education and Research.

He was the project manager for NOAA's Western Pacific Coral Reef Institute at the University of Guam and managed several Cooperative Agreements from the Department of Defense ranging from biosecurity to assessments of indigenous species on military installations.

As the administrator for GCMP, Ed will continue managing Coastal Zone Management grants and over-seeing programs including Federal Consistency, land use and coastal resource protection.

Ed resides with his family in Merizo. He is very active in his village participating in coral reef monitoring and parish activities.

Another new addition to the BSP-GCMP team is Brenda Atalig as Planner I. She is a recent graduate of the University of Guam with a degree in Political Science and a minor in Public Administration.

As a junior planner trained under the guidance of senior planners Esther Taitague and Terry Perez, she is looking forward to being an advocate for Guam's natural resources by educating the general public on the watershed approach for a healthier Guam.


Brenda Atalig

According to Brenda, "natural resources run out and if we do not protect them or use them effectively and efficiently we risk the chance for future generations not to experience our beautiful island as we know it now. I am excited to be a part of this team that is a voice for our environment: be it on land or our coastal reefs."

Brenda enjoys reading a good book and keeping active with her six year old daughter.

Jesse Rojas comes to Guam Coastal Management Program Bureau of Statistics & Plans as our GIS Manager. His vast experiences and knowledge begins as an Engineering Technician II with the Department of Land Management and assisted with the validation of the 1963 Guam Geodetic Triangulation Network to 1993 Guam Geodetic Network. He supervised the first GIS Land Parcel Layer, 1993 Adjusted Layer, Federal Excess Land Layer, both Federal and Local Government Layers, and essentially supervising developments in both GIS and LIS data capture and conversion.

Jesse soon became the GIS/LIS Manager in 2010 and moved to the Office of Technology, a department created through consolidation of information technology functions under the Department of Administration, Data Procession Division.


Jesse Rojas

Jess also serves in the Guam Army National Guard, and enjoys spending his spare time with family both near and far.

Joining the Socio-Economic Planning Program is Estella Marie Blas Tapia as Planner I. In December 2013, she received her Bachelor's Degree from the University of Guam in Business Administration with a concentration in Human Resources.

As the newest planner in the Socio-Economic team of BSP, Estella is responsible for coordinating efforts in managing the Edward Byrne Justice Assistance Grant (JAG) as well as training under Lola Leon Guerrero, Planning Supervisor and Millie Erguiza, senior planner.


Estella Marie Blas Tapia

Estella was recently assigned as an alternate Health and Wellness Coach for the agency to promote the work-site wellness program. "I hope that I can help and inspire other staff from the Bureau to be active and adopt a more positive and healthier lifestyle" said Estella.

Estella was a member of the Guam Women's National Volleyball team in 2010 and served as team captain for Guam at the 2011 Pacific Games held in New Caledonia. While not at work, Estella enjoys spending time with her two beautiful daughters and staying fit and healthy.

Jessica L. Toft is an attorney with a diverse background of practice areas, whose focus is on natural resources and environmental law. Mrs. Toft holds a juris doctorate from the University of Wisconsin Law School. She worked for the Wisconsin Coalition for Advocacy and volunteered at the Wisconsin Coalition Against Domestic Violence.


Jessica Toft

She moved to Guam in 2004, and has held prior positions as a prosecuting attorney at the Office of the Attorney General of Guam, as an associate at Cabot Mantanona, LLP, and as a research attorney for the Superior Court of Guam. She has re-joined the Office of the Attorney General of Guam as an Assistant Attorney General in the Civil Division and assigned to BSP for legal assistance on coastal management, coral reef and natural resources matters.

She is an outdoor enthusiast whose hobbies include hiking, diving, and playing ultimate Frisbee.

BSP Bids Farwell to Retirees

The Bureau of Statistics and Plans applauds five employees for their extensive contributions and service to the people of Guam.

"As long-time members of the Bureau, they will be genuinely missed by their colleagues for their valuable and institutional knowledge and support to the island's community. The Bureau wishes them heartfelt congratulations as they begin another chapter in their lives" said Lorilee Crisostomo, Director.

October 2014


Best wishes to Tom Quinata who retired this past July.


Congratulations Ray Caseres for 30 years of service.


BSP bids farewell and congratulations to Amelia De Leon, Terry Perez, and Therese Aguon on their retirement September 2014.

Catching up with the Guam Community
Coral Reef Monitoring Program

For more information or to stay updated on GCCRMP events, you can visit their website at www.guamreef-monitoring.wordpress.com, like them on Facebook, or email gureefmonitoring@gmail.com.

By Marybelle Quinata

The Guam Community Coral Reef Monitoring Program (GCCRMP) is offering new ways for residents to get involved with coral reef management. Since 2012, over 400 residents have completed GCCRMP's class training and in-water training. Monthly training sessions and monitoring events bring residents together for a collective effort to learn more about Guam's reefs and gather information that can help protect them. This summer, GCCRMP members helped document coral bleaching in Piti and Merizo. Participating members learned how to identify coral bleaching and conducted surveys that can help quantify bleaching in Piti. These sessions have led to conversations with members on climate change, specifically the effects of increased sea surface temperatures.

Another way for residents to get involved is to take the lead in coral reef monitoring and join GCCRMP's Adopt-A-Reef network. Community or school groups, even families, can become site-leaders in their communities by "adopting a reef" in their village. Monitoring adopted reefs will give members first-hand knowledge they can share with their fellow classmates and neighbors. By sharing their experiences members spread awareness about their reef and environmental stewardship activities.

GCCRMP is also working with schools to offer coral reef monitoring as a service learning or community service opportunity for students. Through the program, students experience Guam's reefs first hand to better understand human impacts to our reefs, and connect observations to what they learn in class. It also introduces them to potential careers in marine science and natural resource management. Teachers can arrange to host class training sessions for students at their schools.

And for residents that may not have the time to participate in coral reef monitoring, GCCRMP and National Park Service host monthly Science Sundays at the T. Stell Newman Visitor Center on the third Sunday of each month at 2PM. This public event features talks by scientists about their exciting work to understand and protect Guam's coral reefs. Audience members and scientists engage in open discussions that include personal experiences and issues of concerns about Guam's reefs or other related topics.

Renovated
Agat Small Boat Marina Dock A

The Port Authority of Guam held a ribbon cutting ceremony for the recently renovated Agat Small Boat Marina Dock A. The dock is a low level maintenance facility with the use of no rot recycled plastic composite material, marine grade aluminum frames and stringers, stainless steel components and accessories. PAG received a $250,000 grant award from the NOAA's Western Pacific Regional Fishery Management Council's Sustainable Fisheries and other matching funds for this project. Courtesy of Port Authority of Guam

Kika Clearwater's Summer Camp 2014

For the fourth year in a row, the Bureau of Statistics and Plans, Guam Coastal Management Program and the Guam Environmental Protection Agency, sponsored Kika Clearwater's Summer Camp filled with adventure and packed with island culture.

Over 50 students were immersed in Guam's natural resources and able to visit so many places on Guam from the ridges of Mt. Santa Rosa and Mt. Humuyong Manglo to the shores of Tumon Bay.

They also hiked to Priest Pools in Merizo, 1,000 Steps in Mangilao, and Fonte Dam accessed through Nimitz Hill.

Kika campers discovered how everything upland will eventually impact our coral resources found below.

The eager learners saw first-hand native and invasive plants, native and invasive animals, and signs of erosion caused by fire and feral animals.

Other lessons learned from Kika Clearwater's Summer Camp were the importance of the Northern Guam Lens, cultural respect for our land, and to reuse, reduce and recycle.

The 2014 Kika Clearwater's Summer Camp could not have been such a success without the help from our partners Guam Environmental Protection Agency, Guam Fire Department, Guam Community Coral Reef Monitoring Program, NOAA and various volunteers.

BSP Conducts Damage Assessment to Businesses From Tropical Storm Halong

The Bureau of Statistics and Plans, in conjunction with the Guam Homeland Security Office of Civil Defense conducted a preliminary business sector disaster damage assessment in the aftermath of Tropical Storm Halong's impact to Guam on July 30, 2014.

As mandated by the Guam Emergency Plan, the Bureau is responsible for collecting, preparing and submitting the damage assessment report to the Governor of Guam within seventy-two (72) hours after the Governor declares Condition of Readiness IV.

About seventy-four government officials from eight GovGuam agencies mobilized their teams and resources to assess cost of damages to businesses affected by the storm.

Representatives from the Agency for Human Resources Development, Department of Land Management, Department of Labor, Department of Chamorro Affairs, Guam Economic Development Authority, Guam International Airport Authority, Guam Visitors Bureau, and the Port Authority of Guam surveyed island businesses collecting information on damages and/or loss to building, equipment and merchandise.

Above: Pete Leon Guerrero, BSP Response Activity Coordinator advises Brenda Atalig how to complete the Business Sector Disaster Damage Assessment form and interview business owners.

Survey teams were equipped with Go Kits provided by Guam Homeland Security/Office of Civil Defense to assist in field work activities which included survey forms, pencils, backpacks, clipboards, and raincoats.

Close to 700 businesses were surveyed during the preliminary assessment.

"Many thanks to the dedicated government employees who responded in this effort to address the needs of our business community. The preliminary assessment will help in determining potential federal assistance to the island for use in recovery and rebuilding efforts for our establishments", says Lorilee Crisostomo, Director, Bureau of Statistics and Plans.

MAN, LAND and SEA
BUREAU OF STATISTICS & PLANS

This Man, Land, and Sea newsletter was prepared by the Bureau of Statistics and Plans (BSP) using federal funds, under award NA13NOS4190132 from the Office of Ocean and Coastal Resource Management (OCRM), National Oceanic and Atmospheric Administration (NOAA), U.S Department of Commerce. The statement, findings, conclusions, and recommendations are those of the BSP and do not necessarily reflect the views of the OCRM, NOAA, or the Department of Commerce.

Lorilee T. Crisostomo
Director

GUAM COASTAL MANAGEMENT PROGRAM
Edwin Reyes
Administrator

CONTACT US
P.O. Box 2950
Hagatna, GU 96932
(671) 472-4201/2/3

Manell-Geus, Guam selected as a winner of Habitat Blueprint the next NOAA Habitat Focus Area

NOAA's Habitat Blueprint:

"The vision behind Habitat Blueprint is for healthy habitats that sustain resilient and thriving marine and coastal resources, communities, and economies. Habitat Blueprint provides a forward looking framework for NOAA to think and act strategically across programs and with partner organizations to address the growing challenge of coastal and marine habitat loss and degradation."

In February 2014, NOAA announced the Manell-Geus Watersheds located in Merizo as winners of NOAA's Habitat Blueprint. The week of August 25th members from the Habitat Blueprint reviewing committee arrived on Guam to visit the Manell-Geus Watersheds to gain a first-hand perspective on our issues and resource concerns. The Habitat Blueprint team consisted of a group of people from various NOAA departments, including Buck Sutter, Director of NOAA Habitat Conservation and Leo Asuncion, Acting Director of Hawaii State's Office of Planning.

Valerie Brown, NOAA Marine Ecologist, guided the team on a snorkel in the Achang Bay Marine Preserve where they were able to observe seagrass beds to include a variety of coral and fish species. Following the snorkel, Christine Fejeran, of the Bureau of Statistics and Plans, led a hike into the Manell River Channel explaining how feral ungulates, wildland fires, invasive species and poor land use practices are all major contributors to the erosion and sedimentation issues impacting corals found within the Achang Bay Marine Preserve Area.

Mayor Chargualaf of Merizo, joined the team later that day and participated in a frank but engaging conversation with the Habitat Blueprint team. Mayor Chargualaf vocalized his concerns regarding the safety of his community and the impacts to the natural resources found within the village. Mayor Chargualaf stated "sediment from the mountains will continue to flow into our waters if nothing more is done on the mountains to protect our marine environment. The water will always find a way." Emphasizing this ridge-to-reef connection and the importance of addressing best management practices from an ecosystem approach, the Mayor also shared his concerns on major floods impacting his village community. Habitat Blueprint represents a coming together, pulling of resources, which will strengthen the best management practices proposed for implementation within the Manell-Geus Watersheds.

For more information on Habitat Blueprint visit http://www.habitat.noaa.gov/habitatblueprint/ and under Habitat Focus Area click on Pacific Islands.

The Habitat Blueprint team visit the Manell river site. Photo courtesy of Gerry Davis, NOAA

For more information

on Habitat Blueprint visit http://www.habitat.noaa.gov/habitatblueprint/ and under Habitat Focus Area click on Pacific Islands.

Guam Nature Alliance Launch – August 30, 2014

On August 30, 2014, the Guam Nature Alliance which is comprised of various Government of Guam agencies, nonprofits and educational organizations held a free event with the mission "Connect with your environment!"

The event was held in the Masso Watershed located in Piti and was open to families and students island-wide. The Guam Nature Alliance works towards increasing environmental education on three resource areas Tasi (Sea), Hanom (Freshwater) and Tano (Land) as per the Governor's Executive Order 2014-07.

Event coordinator, Tammy Jo Anderson Taft with the Guam Environmental Protection Agency stated, "We had over 200 students register for the event and every public high school was represented."

The day's events were broken into three major activities. The Tano group held a native tree planting activity at the Masso Reservoir Nature Park and educated participants on the value of native plants and healthy watersheds. Brent Tibbatts with the Guam Department of Agriculture spoke to students about the various native and invasive flora and fauna found in Guam's rivers. Water sampling collection and testing activities captivated the audience who were enthralled by the 'Van Dorn Sampler' which sounded a rather loud "clunk" once triggered. With assistance from Ms. Sydonia Manibusan from University of Guam, students enjoyed deploying the device into the water to collect samples.

Dr. Rouse from UOG spoke about what could be detected in water samples.

The Tasi group took participants out for a snorkeling adventure.

Tree planting, fresh water testing and snorkeling provided by the Guam Nature Alliance launching its community outreach to promote environmental stewardship, a full ridge-to-reef experience.

For more information on free family activities and connecting with our environment, check out the Guam Nature Alliance website at http://epa.guam.gov/activities/guamnaturealliance/ or like us on FaceBook.

MAN • LAND • SEA
a publication by Guam Coastal Management Program

Fire clinics aim to PREVENT ARSON

YONA-

Earlier this year, the Bureau of Statistics and Plans (BSP), Guam Coastal Management Program and various Government of Guam agencies and partners, hosted four free Wildland Fire Awareness & Prevention Clinics. The clinics showcased a variety of demonstrations promoting alternatives to burning trash, green waste, and recyclable items. The clinics were offered in the villages of Piti, Agat, Yona, and Umatac. The clinics were intended to promote, "Munga masongge Guahan. Don't burn Guam!" to encourage protecting our community and natural resources from the devastating impacts from wild land fires. "We want to encourage everyone to use these alternative methods instead of resorting to using fire," said Christine Camacho of BSP.

"Families who use these more green approaches could see a small savings in the bank along with benefits to our island." Wildland fires burn large amounts of land, leaving behind exposed soil which washes into our rivers and onto our coral reefs impacting our water quality, fisheries and tourism. The Coastal Management Program highlighted impacts to our coral resources from sedimentation caused by wildland arson. Guam Fire Department and Department of Agriculture emphasized the importance of fire safety and awareness, while UOG Cooperative Extension Services and I-Recycle engaged participants with demonstrations on alternative uses for green waste and other items usually thrown in the trash. The Coconut Rhinoceros Beetle Eradication team was also available for questions regarding the proper management of mulch and compost piles to control the occurrence of rhino beetles. Kids explored the recyclable craft corner with GCC ECO Warriors and Guam EPA, Smokey Bear and Sparky the Fire Dog were not to be excluded from this awesome community event and presented people with free giveaways and raffles thanks to generous donations from Strike Zone, Coast 360 and Yoga with Olympia Terel.

FIRES ON GUAM: 2012

Type of Fire	Total
Vegetation/Grass	448
Trash/Debris	192
Unauthorized Burning	1233
Total Number of Fires	1873

FIRES ON GUAM: 2013

Type of Fire	Total
Vegetation/Grass	587
Trash/Debris	221
Unauthorized Burning	1237
Total Number of Fires	2045

Source: Guam Fire Department
Compiled by E911/Communications Bureau

INSIDE

■ GCMP has moved!
777 Route 4, Suite 5A,
Phase II Complex
Sinajana, Guam 96910

Obama Appoints Governor Calvo to Climate Change Task Force

WASHINGTON, D.C. -

Governor Eddie Calvo has been appointed to President Obama's State, Local and Tribal Leaders Task Force on Climate Preparedness and Resilience to participate in discussions about ways the federal government responds to the needs of communities dealing with the impacts of climate change.

Meetings in D.C. and regular conference calls took place the past several months addressing the challenges of depleting resources by states and territories of constantly rebuilding infrastructures. However, damaged natural resources such as coral reefs were more challenging to restore as pointed out in the discussions.

Governor Calvo joins the governors of Hawaii, California, Washington, Delaware, Maryland, Illinois and Vermont in working with the interagency Council on Climate Preparedness and Resilience chaired by the White House. Their mission is to identify and suggest removal of barriers between the federal government and communities responding to emergency weather events needing federal support to strengthen their resiliency.

Message from the Director

Hafa Adai!

The preservation of Guam's natural resources is of great importance to all who call Guam home and to our visitors as well. The demands and strain on our ecosystems such as pollution and wildland fires continue to be a growing concern for the Bureau of Statistics and Plans. From our island's breathtaking mountain ridges to coastlines and coral reefs, pollution continues to impact our livelihood. In this issue, we feature the efforts of the Bureau of Statistics and Plans on managing impacts to coastal areas and ensuring that projects are in compliance with federal and established laws. The newsletter also presents public outreach events as a means of engaging the community to better understand Guam's environment and what they can do to protect natural resources.

Living in this tropical paradise has its responsibilities, and we encourage everyone to do their part in keeping Guam beautiful. We hope you will enjoy this issue of Man, Land, and Sea.

LORILEE T. CRISOSTOMO

Protecting Communities through setbacks and permits

A setback is the required distance that a building must be located away from the streets, easements, property lines, and other structures. The size of the setback is determined by Guam's Zoning Laws and the size of the setback all depends on the zoning of the property.

For a single-family or multi-family structure for instance, the minimal allowable setback for front yard is 15 feet, the side yard is 8 feet and the rear yard is 10 feet. Setback requirements for commercial and industrial areas are slightly different. There are several reasons why all residential structures should have adequate setbacks.

Setbacks also ensure that there is adequate room for emergency vehicles to maneuver between and around the properties and provides space for maintenance on the home. Setbacks provide uniformity to a neighborhood and establishes placement between the homes or buildings. Setbacks allow some privacy between neighbors and also provide distance between neighbors to lessen noise and odors.

ARC Applications	2013	As of August 2014
Zone Variance	8	15
Zone Change	10	4
Tentative Development Plan	3	1
Summary Zone Change	5	9
Minor Setback Variance	17	9
Conditional Use	4	1
Seashore Clearance	0	1
TOTAL Reviewed	**47**	**40**

Setbacks also give residents space to properly place septic tanks and leaching fields in areas where public sewer lines are not present. Another reason for setbacks is to give distance to provide space for light and air circulation, and provide open space for landscaping and recreational use.

Guam's Zoning Law established regulations in order to: encourage the most appropriate uses of land; provide adequate open spaces around buildings; prevent undue concentration of population; assure adequate provisions of schools, parks, recreation and other infrastructure; and control the types of development which would create a nuisance and/or a health and safety hazard.

In general, setbacks are required when building your home or any structure for general welfare and safety.

To propose a development that does not comply with the zoning regulations, you may apply for a zone change through the Guam Land Use Commission, a decision-making body empowered to grant subdivisions approvals, zone changes, conditional uses and variance from Guam land use laws and regulations. The Guam Coastal Management Program represents Bureau of Statistics and Plans with seven other agencies forming the Application Review Committee providing technical review to the commission.

For more information on what permits are required for certain activities please visit the One Stop Center at the Department of Public Works compound or visit our website: bsp.guam.gov, to view the Guidebook to Development Requirements on Guam.

This guide delineates each type of requirement for development by summarizing its purpose and nature, citing the Government agency with authority for approval, describes the application review process, and presents a sample of appropriate applications and suggests additional references for more detailed information.

GCMP leads federal consistency reviews

Bureau of Statistics and Plans and its network partners recently toured Finegayen, the proposed site for the construction of a main cantonment to support the relocation of U.S. Marines. The site visit was in accordance with the federal consistency review by Guam Coastal Management Program. Government representatives are from BSP: Director Lorilee Crisostomo, Esther Taitague, Lola Leon Guerrero, Monica Guerrero, Terry Perez, Brenda Atalig, Millie Erguiza, Mely De Leon, Christine Camacho, Tom Quinata and Estella Tapia. AG's Office: Jessica Toft; GWA: Vangie Lujan; Guam EPA: Angel Marquez, Ray Calvo, Johnny Abedania; Governor's Office: Mark Calvo; DPW director Carl Dominguez; DOAG: Deputy Director Matthew Sablan, Tino Aguon, Jeff Quitugua; NOAA : Adrienne Loerzel and Val Brown Hosting the tour are NavFac DPRI officials Albert Borja, Mark Cruz, Alex Oviedo, Rodney Palacios, Stephanie Aromin and Jennifer Farley.

HAGATNA-

In 1972, the Coastal Zone Management Act (CZMA) was adopted to help states and territories in managing impacts to coastal areas. This created the concept of federal consistency, a powerful tool that state governments can use to protect natural resource areas and waterways.

Simply put, any federal agency that is planning an activity in a coastal area must make sure they are consistent to the maximum extent practicable policies of the Guam Coastal Management Program in accordance with the CZMA (U.S. PL. 92-583) as amended (U.S. PL. 94-370).

Federal consistency is a program run by the local state, and approved by the federal government, that has the ability to review actions by federal agencies and make sure they are following the right laws and regulations locally.

Guam's lead for federal consistency reviews is housed at the Guam Coastal Management Program (GCMP) of the Bureau of Statistics and Plans.

"It is very important to review projects and make sure they have made plans to be consistent with Guam's laws and regulations," said Mely De Leon, lead planner for Federal Consistency.

"We can help protect natural resources through careful planning and making sure all aspects are included into the initial phases of projects."

The review process usually includes multiple agencies including Government of Guam organizations and federal agencies.

"We typically work closely with the Guam Department of Agriculture, Guam Environmental Protection Agency and the U.S. Army Corps of Engineers to make sure we are not missing any aspects or potential impacts from a proposed project," De Leon said.

Federal Consistency Projects

	2013	as of July 2014
Federal Activities	18	19
Federal License/Permit	31	15
Federal Assistance	11	46
Total Reviewed	60	80

Using green waste for composting

YONA -

Phoebe Wall with the UOG Cooperative Extension Service demonstrated sheet mulching and composting techniques to community members who participated in the four free fire clinics offered earlier this year. Wall utilized a large aquarium tank to demonstrate the proper layering of organic materials used for the demonstrations.

This approach made it easier for participants to see and understand the layering concept in sheet mulching. Sheet mulching also known as "lasagna gardening" or "layered composting" is a no-till gardening/farming method which incorporates a four layered mulch system. It imitates what naturally occurs in an undisturbed forest and is a low maintenance practice that promotes healthy productive soil.

Benefits of sheet mulching are: water conservation, suppresses weeds, keeps soil cool in hot weather, encourages root development, increases plants health, and releases nutrients slowly by understanding the differences between greens (high in nitrogen) and browns (high in carbon). Greens are made up of materials such as kitchen wastes, coffee grounds, grass clippings, chicken, pig and cow manure. Examples of browns are twigs, branches, leaves, news papers, and cardboard, to name a few.

Materials high in nitrogen decompose much faster than materials with high carbon. Meats, bones, fatty foods, pet litter, dead animals, and human/pet manure are not recommended for composting.

For more information on composting and mulching contact the UOG Cooperative Extension Service. Munga masongge Guahan, Don't burn Guam!

Benefits of sheet mulching are: water conservation, suppresses weeds, keeps soil cool in hot weather, encourages root development, increases plants health, and releases nutrients slowly by understanding the differences between greens (high in nitrogen) and browns (high in carbon).

3rd Annual Pig derby a 'Wild' Success

HAGATNA- The Guam Coastal Management Program, Bureau of Statistics and Plans (BSP-GCMP) and Guam Department of Agriculture hosted the third annual Pig Hunting Derby and Pork in the Park Cook-Off event last fall. Special thanks to I-Recycle and the Farmers Cooperative Association of Guam for helping to build support for the derby and cook-off. The derby and cook-off are Guam's Micronesia Challenge events. Essentially, the community comes together to celebrate protecting and sustaining the island's terrestrial marine and cultural resources and heritage. "Tana' maolek mo'na Guahan, let's make a good future for Guam."

The event had about 113 participants which included hunters and hunter support plus over 60 volunteers from various Government of Guam Agencies and organizations. Every participant, including volunteers were required to attend a free Hunter Safety Briefing prior to participating in the derby. A total of 60 pigs were brought in, 11 by bow and 49 by firearms.

Winners of the derby are:

MOST PIGS:	Archery	NO. of PIGS
First Place	Felix Quan	3
Second Place	Justine Alvarez	3
Third Place	Jeff Kinard	1

MOST PIGS:	Firearms	NO. of PIGS
First Place	Michael Perez	7
Second Place	Will Taft	5
Third Place	Vincent Benevente	4

LARGEST PIG:	Firearms & Archery	WEIGHT
First Place	Joe Benavente	275 lbs.
Second Place	Joey Lopez	210 lbs.
Third Place	Peter Kautz	188 lbs.

Pork in the Park Winners Announced

The Pork in the Park Cook-off Winners were either hunters in the Pig Hunting Derby or individuals who received meat from derby participants. 'Feral meat' was the name of the game and the challenge was to create a dish so flavorful and tempting that non-pork consumers were brought to the table.

Held at the Adelup Beach Park, the cook-off included displays from the Guam Department of Agriculture, U.S. Department of Agriculture-Wildlife Service and NRCS, GCC EcoWarriors, I-Recycle, Coconut Rhinoceros Beetle Eradication team, Guam EPA, Department of Public Health & Social Services, Guam Micronesia Challenge, Guam Coastal Management Program, and entertainment from the DL Perez Elementary School Chamorro Class.

The natural resource mascots were not to be excluded from this educational event. A mascot parade took place bringing together, Sparky the Fire Dog, Smokey Bear, Piti Pete, Chelu the Koko Bird, the Angel Flame Fish. Additionally, awesome prizes and giveaways were raffled to all who came and joined in on the free tastings offered during the cook-off. Sponsors for the derby and cook-off included: Primos Construction, Guam Visitors Bureau, Triple J Auto Group, Island King Imports, Micronesian Chefs Association, Meskla, Proa Restaurant, Delmonico's Kitchen, Le Tasi Bake Shop, PCR Environmental, Inc., Guam EPA Employees Association, Docomo Pacific, Pay-Less Supermarkets, Joe Okada "Tunu" and Bryan Duenas.

Winners of the cook-off are:

COOK-OFF WINNERS

Pot Category	Kevin Aguon - Still Smokin'
Pit Category	Chef Darren Dragon

PEOPLE'S CHOICE WINNERS

First Place	Team Kanta Babui - Joe Blas
Second Place	Team Siuufa' - Peter Kautz

Modernizing the Port

Piti -

On December 23, 2013, the required public hearing for the Jose D. Leon Guerrero Master Plan Update 2013 Report was held at the Port Authority of Guam Training Room called jointly by the Director of Bureau of Statistics and Plans (BSP) and the General Manger of the Port Authority inviting the public to attend and provide comments.

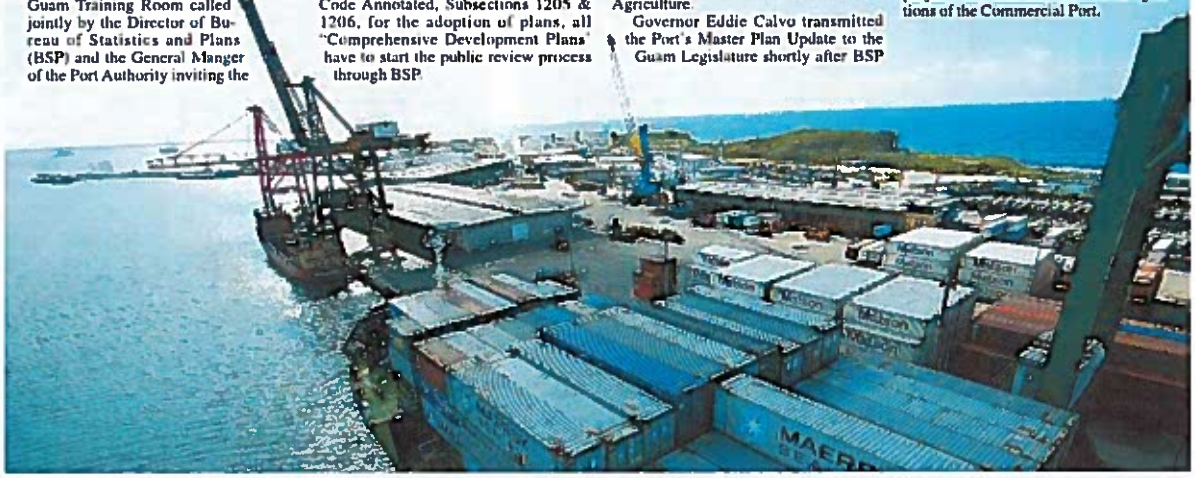
In addition, the Master Plan Update was made available at the Port's website and hard copies were available at BSP's Guam Coastal Management Program Office.

As mandated by Title 5 of the Guam Code Annotated, Subsections 1205 & 1206, for the adoption of plans, all "Comprehensive Development Plans" have to start the public review process through BSP.

In addition to BSP's land use review, BSP coordinated technical reviews from its networking Government of Guam agencies: the Department of Land Management, Guam EPA, Department of Parks and Recreation, Department of Public Works, and the Department of Agriculture.

Governor Eddie Calvo transmitted the Port's Master Plan Update to the Guam Legislature shortly after BSP submitted its recommendation to the Governor to approve the Port's Master Plan Update as an official element to Guam's Comprehensive Development Plan for it addresses the Port's modernization in the next five years, reduction of the military build-up, and securing financial self-sufficiency and sustainability.

Guam Public Law 32-155 was signed into law on May 21, 2014 by Lieutenant Governor Ray Tenorio, Acting Governor at that time, adopting the Guam Master Plan Update 2013 for the improvement projects schedule and land use designations of the Commercial Port.



Working on Merizo Marine Resources

With the technical assistance of NOAA's Western Pacific Fishery Management Council, the Merizo or Melesso residents and Merizo Mayor Ernest Charguralaf spent many hours at meetings and workshops addressing the needs and challenges for the village of Merizo to manage its coastal and marine resources.

Section 63133 mandated by Public Law 29-127 basically states that the Chamorro people have specific rights to off-shore fishing and harvesting of resources in reference to indigenous fishing rights.

Since village resources are best understood at the village level, residents met at the Merizo Community Center to discuss local fishing access to seasonal runs of traditional harvested fish, conduct regulatory monitoring and advisory of PCBs around Cocos Island and Lagoon inclusive of oceanographic patterns, address lagoon conflicting water-use activities through zoning, establish Committee of Elders at Mayor's Office, and much more.

The Community-Based Management Plan for Melesso Coastal & Marine Resources citing the discussions at the workshops and recommendations by the village residents were forwarded to Departmentof Agricuture providing input to the development of the rules and regulations regarding indigieous fishing rights.

Left: Merizo Mayor, Ernest Charguralaf (center), welcomes technical assistance from Charles Kaalal and Mark Mitsuyasu of NOAA's Western Pacific Regional Fisheries Management Council at community-based workshops held at Merizo Community Center in August & November 2013.

Guardians of the Reef Program

Funded by NOAA grants of U.S. Department of Commerce, the Guardians of the Reef outreach program continues for the 9th year to be implemented by the Bureau of Statistics and Plans.

The intent of this program teaches our youth the importance of how Guam's coral reefs are to the fish populations and marine tourism.

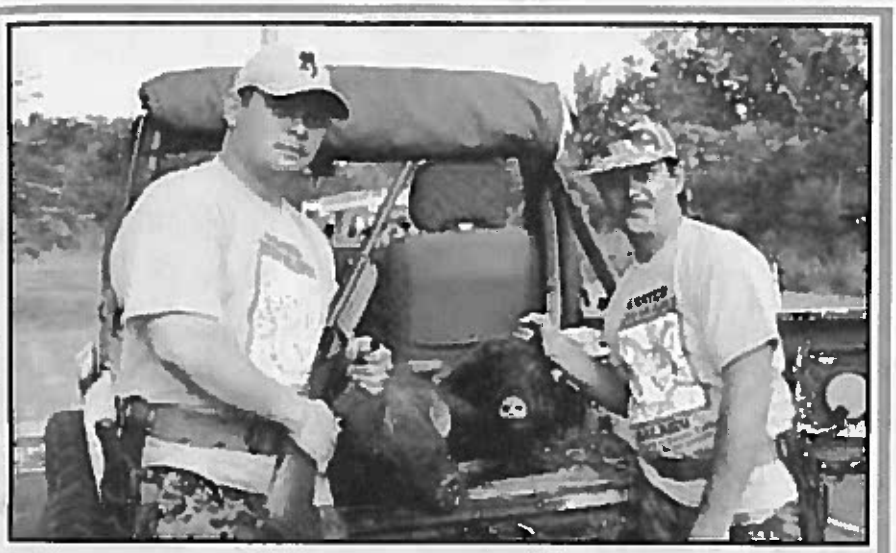
This outreach started off with training Juniors and Seniors from George Washington High School, Simon Sanchez, John F. Kennedy, and Southern High School to be Guardians of the Reef.

On January 25, 2014, over 80 students attended the training at the Holiday Inn Resort to develop lesson plans for 3rd graders and 5th graders about basic coral reef biology.

In March and April, the Guardians conducted presentations to 3rd graders and puppet shows to 5th graders reaching over 3200 students in the Guam Department of Education elementary schools.

Although the main focus of the Guardians of the Reef outreach was bringing awareness of protecting coral reefs, public speaking, teamwork building, and service learning were the benefits too for the Juniors and Seniors who participated on this fun and exciting activity.

MAN LAND AND SEA
TAOTAO TANO TASI
VOLUME 5 - ISSUE 1 - SPRING 2012



FRESH FROM THE HUNT - Joey Terlaje and crew in the first Pig Hunting Derby in Guam pose with their catch. The derby included four check in stations in the villages of Dededo, Santa Rita, Agana Heights and Talofofo.

First Pig Hunting Derby and cookoff a success

TALOFOFO - The first pig hunting derby in Guam's history concluded successfully last month.

"The derby saw about 10 pigs killed in the wild by local hunters, and most of the meat was prepared for the cookoff or donated to families," said event organizer Christine Camacho. Camacho is a project coordinator with the Guam Coastal Management Program, Bureau of Statistics and Plans.

"The derby was a great way for hunters to meet and talk about different methods," Camacho said. "By supporting our local hunting community, not only are we able to access fresh meat, but promote land conservation efforts for Guam."

Camacho said they hope to assist in planning another derby and make the event an annual occassion. The derby was also followed by a successful cookoff featuring local chefs and their dish of local pig meat.

Coral monitoring team gears up for field season

HATGATNA - The Guam Coral Reef Monitoring Group (GCRMG), a partnership started in 2006 between local and federal agencies and the University of Guam Marine Lab, has put together a coral reef monitoring program to help study our coral reefs in order to make decisions about how to protect these resources for the future.

The coral reef monitoring program studies how much coral Guam has (abundance), how big the corals are (size), and how healthy they are (co dition); the program also loo at the abundance and size the different kinds of fish a other sea creatures which c coral reefs their home, with particular focus on those sp cies that are most important food and those that can ha major impacts on the over health of the entire ecos tem. The monitoring progra also studies different aspects ocean water which can affe coral reef health.

MONITORING - Pg.

Free activities and camp this summer

CAMP - Pg. 3

OUTDOOR ADVENTURES - Students learn during the free 2011 camp by GCMP and the Guam Environmental Education Committee. See Page 3 for more information on this year's camp.

contents

News staff on board to support monitoring program
Page 2

Protecting ko'ko birds at Cocos Island and teaching students
Page 8

What animal is this? Find out how your name could be in our next issue!
Page 7

Free Educational Events for families
Page 3

A message from the Director

Hafa Adai and thank you for reading Man, Land and Sea this month.

We are happy to recognize the efforts of our coral reef monitoring team this month.

Their work will help us understand coral reefs and the impacts affecting them during the upcoming years.

This month we also look forward to our summer activities including a free camp for children, hikes and snorkeling events.

I encourage all residents to get oudoors this summer and experience some of Guam's ecosystems. This is the best way to understand our island.

Si Yu'us Ma'ase,

THOMAS A. MORRISON
Director, Bureau of Statistics and Plans

GCMP welcomes coral reef biologist for monitoring

HAGATNA - The Guam Coastal Management Program, through the National Oceanic and Atmospheric Administration Coral Reef Conservation Program, welcomes Roxanna Miller.

Miller is the Regional Management Support Specialist and will be working on the long-term monitoring program, helping collect and analyze coral reef monitoring data.

"I'm excited to work with the staff at GCMP and continue to help support coral research in Guam," Miller said.

Miller received her Bachelor's Degree in Marine Science: Biology from Long Island University: Southampton College in 2006.

Three months later, she moved to Guam to pursue her Master's Degree at the University of Guam (UOG).

While at UOG, she studied coral ecology and disease with her Master's thesis focused on better understanding the coral disease of growth anomalies.

MONITORING CORALS - Roxanna Miller, as a graduate student at the University of Guam, takes measurements of corals near Piti.

Miller graduated from UOG in May of 2011. Between graduation and becoming the Management Support Specialist, Miller worked on several projects, including monitoring of coral disease on several of Guam's reef flats. She also worked for a small environmental consulting company doing a variety of environmental projects. Miller has been part of the GCMP management team since February 2012.


BUREAU OF STATISTICS AND PLANS
Thomas A. Morrison
Director


GUAM COASTAL MGT. PROGRAM
Evangeline D. Lujan
Administrator
vaguelujan@yahoo.com


GCMP STAFF
Tom Quinata
Dave Burdick
Amelia F De Leon
Esther G. Taitague
Terry M. Perez
Christine Camacho
Raymond Caceres
Victor Torres
Timothy Semuda
Nydia Llarena
Roxanna Miller






CONTACT US
P.O. Box 2950
Hagatna, GU
96932
(671) 472-4201

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Kika Clearwater's Page for Kids!

Hi Kids, It's Kika Clearwater again!
This month we are learning about freshwater. The word for freshwater in Chamorro is hanom.
We all need water to live and so I have a puzzle and some tips that you can use to help keep Guam's hanom clear and clean.
Have fun and just keep swimming! Kika

Kika's fun puzzle

V	I	J	N	B	L	R	S	L	R	P	F	E	B	P
D	E	A	O	E	S	D	I	E	L	J	I	J	T	V
R	Y	G	A	U	N	O	T	N	A	E	L	C	B	M
A	N	K	E	A	S	A	T	N	E	M	E	V	A	P
I	S	Q	L	T	W	P	F	R	F	I	S	N	E	S
N	M	T	F	M	A	U	O	I	E	T	S	R	G	E
G	E	A	R	G	E	T	S	L	R	T	O	Q	Y	D
W	U	O	R	N	V	H	I	E	L	S	T	C	S	I
D	T	X	E	I	V	W	A	O	I	U	Y	I	A	M
S	C	H	C	D	Z	M	F	O	N	R	T	Y	L	E
Y	B	I	Y	O	S	T	N	E	M	S	I	I	P	N
S	V	C	C	O	Q	U	A	L	I	T	Y	V	O	T
L	M	U	L	L	C	O	M	P	O	S	T	Q	E	N
T	Z	L	E	F	R	A	I	N	N	F	U	Q	H	R
A	H	V	B	Z	R	W	L	I	H	J	C	H	C	A

Look for the words that are written in all capital letters.

- STREAMS are wonderful places to swim, fish or explore.
- WETLANDS provide essential habitat for wildlife.
- The Ylig RIVER collects the flows from the Tarzan River.
- STORMWATER is the water that flows over the surface of the land after a RAIN storm.
- When VEGETATION is converted to PAVEMENT, water cannot infiltrate through the soil.
- LITTER is a terrible cause of POLLUTION in our streams, wetlands and lakes.
- When SOIL is washed away by water, wind or gravity, this process is called EROSION.
- SEDIMENT is the name for eroded soil transported by stormwater into a stream.
- When sediment builds up in streams, it causes FLOODING and smothers FISH habitat.
- We all play a role in protecting water QUALITY.
- Here's what you can do: put trash in the trash can, RECYCLE, COMPOST grass clippings, and fix LEAKS on your car.
- It's also very important not to pour anything down the storm DRAIN.
- If we all pitch in, we can keep our streams CLEAN!

Check it out! This awesome Website guamwaterkids.com has more games and fun activities about water on Guam!

Have fun at work or play this summer with no harsh chemicals!

Window Cleaner

8 cups of water
1 cup of vinegar

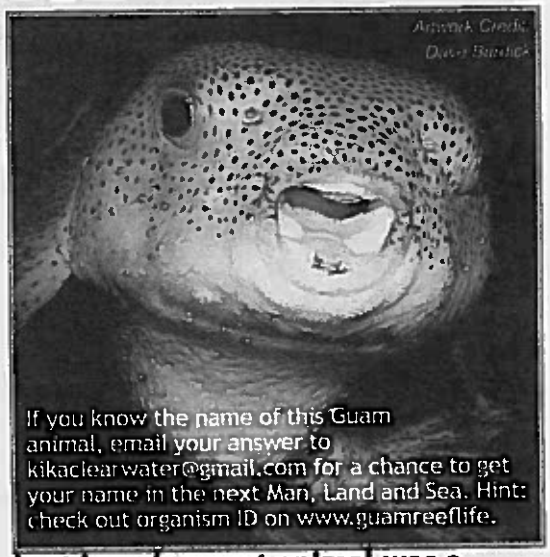
Mix ingredients, scrub and wipe with newspaper. You can even add a splash of lemon to make it smell super nice!

Paint for fun

½ cup cornstarch
2 cups cold water
Food coloring (any color)

Mix cornstarch and water in a saucepan. Bring the mixture to boil and continue to boil until it thickens. Let the mixture cool slightly. Pour into jars and color each with food coloring.

WHAT AM I?



If you know the name of this Guam animal, email your answer to kikaclearwater@gmail.com for a chance to get your name in the next Man, Land and Sea. Hint: check out organism ID on www.guamreeflife.

Last issue's secret animal was a snake eel or *Ophichthus melanochir*.

YOU CAN MAKE A DIFFERENCE

PEOPLE MAKING A DIFFERENCE

UOG's Green Interns spend year in service

MANGILAO - Their presence is undeniable.

If you attended any environmental event during the past eight months you may have seen a dozen University of Guam students clad in green.

Their shirts indicate the type of behavior they are trying to promote - green and sustainable living.

The UOG Green Interns have been a very active force this past school year.

They recycled aluminum at multiple events.

Because of their hard work, we know more about the buying habits related to unsustainable products like styrofoam plates.

They supported multiple educational and outreach events including the Guahan Earth Festival, UOG Charter Day and free snorkeling events.

Anyone lucky enough to have seen them plant trees above the Masso Reservoir would have no doubt about the interns' work ethic. Despite the grueling heat, steep hill and long hours, they trudged on.

The Green Interns made their mark this school year. According to UOG Sustainability Coordinator Elvie Tyler, they not only learned a lot, but were able to help raise awareness of environmental issues on Guam. "These students will be environmental leaders of the next generation," she said.

Planting trees and loving it -Green Interns with the University of Guam completed multiple community service projects during the 2010-2011 school year. Interns helped plant more than 2,000 trees above the Masso Reservoir in Piti. They recycled with the i'Recycle program at various events and hosted multiple outreach events about how to live in a more sustainable manner. The bottom right photo is the Green Interns with their advisor, Elvie Tyler, the UOG Sustainability Coordinator.

Free snorkeling events with 'Ready, Set, Snorkel!'

Environmental Education Committee offers free events for families across the island throughout summer and fall 2011

MANGILAO - Grab your rash guard and get ready to meet at the beach.

This summer, the Tasi Group of the Environmental Education Committee will host multiple "Ready, Set, Snorkel" events across the island.

"We are excited to offer these free events so community members can give snorkeling a shot," said Tammy Jo Anderson Taft of the Tasi Group. "So far we have had a great response and we hope to see more families come out and take advantage of this program."

The events are free to all members of the public and include a safety briefing, instruction on snorkeling and free loaned gear to use during the event.

The Tasi Group is one of three smaller groups in the Environmental Education Committee. Organizations involved include the Guam Coastal Management Program, University of Guam, the National Park Service, TASI, Simon Sanchez Sharks MADE and George Washington High School's Marine Mania.

Snorkeling Events

Saturday, June 18 - Agat
Saturday, July 16 - Pago Bay, Yona
Saturday, Aug. 13 - Piti
Saturday, Sept. 17 - Rititidian
Saturday, Oct. 15 - Merizo
Saturday, Nov. 12 - Adelup Point
Saturday, Dec. 10 - Family Beach

Upcoming events

Saturday, June 11
Movies in the Park at Asan Beach sponsored by the National Park Service

Saturday, June 18
Ready, Set, Snorkel with the Tasi Group in Agat.

Monday, June 27 to Friday, July 1
Week 1 - Kika Clearwater's Camp for Kids

Monday, July 11 to Friday, July 15
Week 2 - Kika Clearwater's Camp for Kids

Monday, July 25 to Friday, July 29
Week 3 - Kika Clearwater's Camp for Kids

MAN • LAND • SEA

News of Guam and her Ocean Environment

Volume 3 • Issue 2 • Summer 2010

SPECIAL REPORT

Study finds Mafuti in protected areas have more babies

HAGATNA - Mafuti, or Thumbprint Emperors, inside Guam's Marine Preserves are often larger than those outside the preserves and can make more eggs because they live longer, according to a recent study completed by a student at the University of Guam (UOG) Marine Lab.

The research looked at Mafuti in four areas around Guam. Two areas are Marine Protected Areas (MPAs) and the other two areas are not protected.

The Mafuti in the MPAs were larger and able to produce more babies than Mafuti outside the preserve, according to UOG Marine Lab research student Brett Taylor.

"Larger fish have more eggs and there were more larger fish inside the preserve than outside ," Taylor said. Marine preserves help protect the larger fish so there will continue to be Mafuti in Guam's waters.

Taylor began his study in 2007. He chose Mafuti to study **Mafuti Babies Pg 5**

Teacher joins scientists to study northern islands

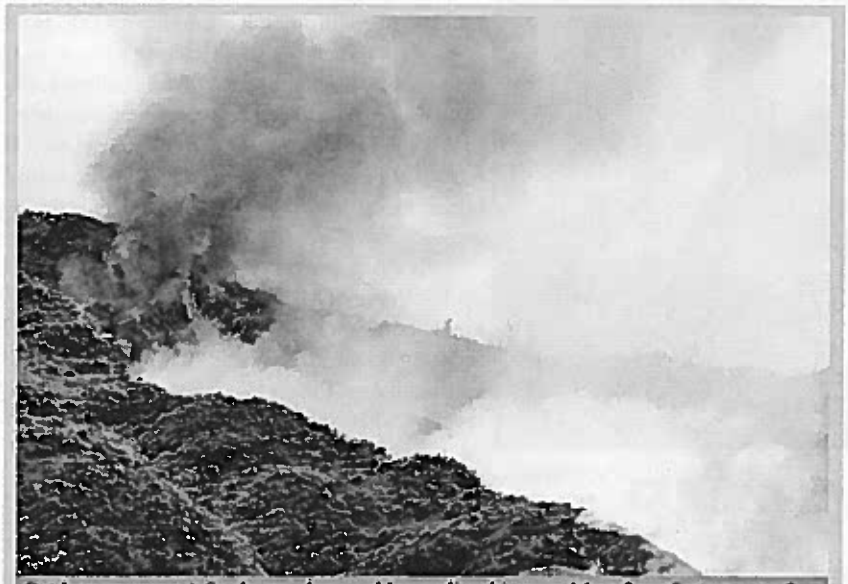
MANGILAO - Earlier this year a group of scientists set out on a month-long study to find how many fish live around the islands of the northern Marianas Island chain.

Tatreau

The NOAA Ship Oscar Elton Sette left Guam on Thursday, Feb. 11, with a few Guam residents aboard including a teacher at George Washington High School.

Linda Tatreau, a marine biology teacher, explains in her blog about the trip that the group is headed out to use sonar, video cameras and other ways to survey fish.

The crew also experimented with using wireless signals to get underwater photos from Autonomous Underwater Vehicle, or AUV, that was not connected to the ship by any cable or wires. **Cruise Pg 3**



Set by someone: A fire burns along a ridge earlier this year. Most fires that get out of control are set by poachers or irresponsible individuals looking for deer.

Flames burn in south

Residents asked to report arson

TALOFOFO - Dry season puts us all at risk.

Brown grass, dry trees and the dry heat makes the perfect combination for out-of-control fires.

How do fires start on Guam?

"Most fires that get out of control are set on purpose," said Elaina Todd, campaign manager of the Na Para I Guafi effort.

"People set fires to clear an area for farming or to hunt easier," she explained. "The deer love to come eat the new plants that grow after a fire is over. People love to eat the deer."

Having so many fires set intentionally destroys more than just trees and grass, Todd explained.

Homes, cars, storage units, buildings and utilities can all be harmed by wild land fires.

This year alone, more than 500 acres have burned. Some of these fires have come within feet of burning down homes in villages including Piti, Merizo and Talofofo.

A fire can continue to destroy even after **Fires Pg 4**

NA PARA I GUAFI

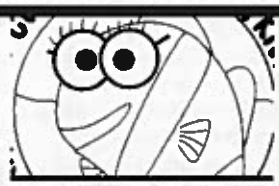
TO REPORT ARSON
- Call 911 right away

FOR MORE INFORMATION
- Call the Guam Fire Dept. at 649-8805 about open burning or the law.
- Call Todd at 475-4468 about the Na Para I Guafi campaign.

contents

What can you do when the final EIS comes out?
The military buildup is coming. What's the next step? *Pg. 3*

Try volunteering this summer to help recycle
Help recycle at the Liberation Day carnival and parade. *Pg. 8*



Coloring activities for kids and a special maze
Kika's Kids Page is full of activities *Pg. 7*

See what we pulled out of the Manengon River
Pg. 6

Our Coasts. Our Future.

A message from the director

Hafa Adai and thank you for reading Man, Land and Sea this month.

Our coral reefs and land are in constant threat from sediment. Much of this mud comes from areas that have been intentionally burned by arsonists.

This has to stop.

This issue of Man, Land and Sea we are focusing on the effects burning has on the coral reef and what we, as citizens, can do to stop it.

As with many environmental efforts, it will take all of us to step up to the challenge. We are a resilient people and I know we can stop burning before it destroys our land and coral reefs forever.

Sincerely,
ALBERTO "TONY" A. LAMORENA V
Bureau of Statistics and Plans

GCMP reviews buildup Federal Consistency

The Bureau of Statistics and Plans (BSP), Guam Coastal Management Program (GCMP) is reviewing the Federal Consistency Determination for the proposed military buildup. Every proposed activity by federal agencies that will affect any land, or water use or any natural resource of the coastal zone is required to complete this review process.

The Federal Consistency review process includes determining if the proposed actions are, to the maximum extent possible, in compliance with all approved enforceable policies of the Guam Coastal Management Program.

As required by 1972 Coastal Zone Management Act, the Department of Defense (DoD) submitted a letter to GCMP requesting the agency's agreement with their findings. The letter states how the proposed military buildup actions comply with local coastal zone laws and enforceable policies.

In multiple summaries, DoD states "all proposed actions within Guam's coastal zone would comply with Guam enforceable policies to the maximum extent possible."

The Coastal Management Program is currently reviewing DoD's statements and compiling a response. Determining if the proposed actions meet the requirement of Federal Consistency is a review process separate from the commenting process for the Draft Environmental Impact Statement under NEPA.

"This process of determining if a project plan would have impacts on the coastal zone is very important," Evangeline Lujan, administrator of GCMP, stated.

"This is an opportunity for our community to provide input to the actions related to the military buildup," said BSP Director Tony Lamorena.

Federal consistency review public notice

1) Guam WaterWorks Authority (GWA) Central Sewer Upgrade Project (Revised)

2)NOAA/NMFS Western Pacific Fishery Management Council amendment to the Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific.

3) US Coast Guards (USGS) proposes establishment of a nationwide ballast water discharge standard which vessel owners would comply with to prevent or reduce the introduction and spread of non-indigenous species in U.S. waters (rule making for Standards for Living Organisms in Ships, published on August 28, 2009 (74FR 44632) Draft Programmatic Environmental Impact Statement (CD-Rom) can be found at http:www.regulations, gov, docket ID USCG-2001-10486.

GCMP welcomes new Education and Outreach Coordinator

HAGATNA - In January the Guam Coastal Management Program welcomed their new Education and Outreach Coordinator.

Tammy Jo Anderson Taft will be working with the office to do outreach about environmental issues.

MAN, LAND & SEA NEWSLETTER
Volume 3 Issue 2

EDITORS
Tom Quinata
Esther G. Taitague

BUREAU STATISTICS & PLANS
Alberto A. Lamorena V
Director

GUAM COASTAL MANAGEMENT PROGRAM
Evangeline D. Lujan
Administrator

GCMP STAFF
Raymond Caseres
Amelia De Leon
Terry M. Perez
Esther G. Taitague
Victor Torres
Timothy Semuda
Nydia Llarenas
Dave Burdick
Tom Quinata
Elaina Todd

NOAA CORAL REEF MANAGEMENT FELLOW
Tammy Jo Anderson Taft

FOR GCMP INFORMATION
Please contact:
Evangeline Lujan
Man, Land & Sea Newsletter
Guam Coastal Management Program
Bureau of Statistics & Plans
P.O. Box 2950
Hagåtña, Guam 96932

TEL:
671.472.4201/2/3

FAX:
671.472.1812

E-MAIL:
vange@mail.gov.gu

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Wildlife Festival Saturday May 1st

Guam's forests have been silent for too long.

Long ago, the forest was bustling with hundreds of birds and fruit bats. Many of these animals were found no place else in the world.

Today, the jungle is almost silent. The forest now offers a place to reflect on the loss of almost all of the island's native forest birds.

Celebrating that wildlife and encouraging activities that protect birds and fruitbats are the goals behind *Espiritun i Fanihi - Celebrating Marianas Wildlife*.

The festival is free to the public and will feature reggae singer Clinton Fearon. There will also be performances by school children and educational booths.

Espiritun i Fanihi
- 4 p.m. to 7 p.m.
- Saturday, May 1, 2010
- Skinner Plaza in Hagatna, Guam
- For more information, check facebook or email medinas@guam.net

"This is a very family-friendly educational event that will help everyone to remember that our actions every day affect the environment and the animals we share this island with," Suzanne Medina, biologist with the Guam Department of Agriculture.

Although some of Guam's native animals are still alive, many were pushed into extinction by the invasive Brown Tree Snake.

Despite the snake, Medina and others at the Department of Agriculture work hard to keep the Koko bird, fruit bats and other endangered animals alive and remind the island of their importance.

Koko Bird: The Guam Rail is one of many endangered native animals.

How many fish are in the seas around the Marianas

Cruise, contd. from Pg 1

The crew used sonar to map the ocean floor and other modern-day technology to gather information about fish stocks and how fishing pressures may be affecting the Marianas Island chain.

BRUVS

In the past, fish populations have been counted by catching fish, visiting fish markets and interviewing fishermen. This trip did not need to catch fish to count them.

The crew used cameras with fish bait, a towed camera and sound equipment to survey how many fish were in the area.

These camera units are officially called Baited Remote Underwater Video Stations or BRUVS.

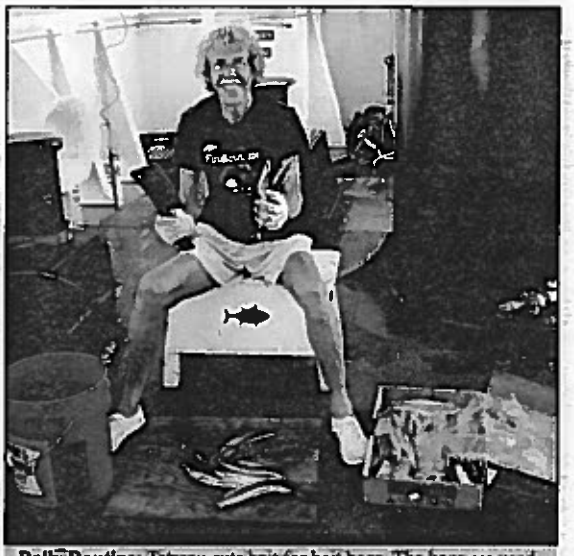
BRUVS are an economical way to study fish. Each unit only costs about $5,000.

During the NOAA cruise, the crew used eight BRUVS and gathered eight hours of video footage from the sea floor.

To prepare the units, the crew would set the eight units to record for an hour or longer and then attach a basket of oily fish in front of the two cameras. Two camera angles are used to determine how large the fish on screen actually are.

Because fishing pressures tend to affect large fish, having two cameras was extremely important.

The ship returned to Guam in mid-March with more information about fish stocks and many interesting stories.



Daily Routine: Tatreau cuts bait for bait bags. The bags are used to attract fish to the underwater cameras so scientists can see how many, and what types of fish are present.

CONNECT TO THIS STORY ONLINE
- Check out Tatreau's blog at http://fish250.viofapor.com

Site has environmental educational tools for teachers and parents

A new website has lesson plans, coloring activities and a listing of field trips and speakers for teachers and parents.

The site was started earlier this year by the Guam Environmental Education Committee. This group works to promote environmental information and teaching on Guam.

The site includes a listing of volunteer activities for upcoming environmental events including recycling at the Liberation Day Carnival and Parade.

Many of the teacher resources on the site are Guam-specific. There are lesson plans written by students at the University of Guam and from local agencies. The site also includes coloring pages and story books about environmental issues on the island.

For example, one coloring book about coral reefs includes information about Guam's marine preserves. Another about the danger of wildland fires, has information about how to contact the Guam Fire Department or police.

The site also has information about ongoing environmental programs like Guardians of the Reef, beach cleanups organized by the Micronesian Divers Association and upcoming recycling events with IRecycle.

CHECK IT OUT
www.guamenvironmentaleducation.com

Final EIS may come out soon

The proposed military build-up will change Guam forever. Residents of Guam will soon get another chance to review the military's plan to move a Marine base from Okinawa to Guam.

After an Environmental Impact Statement (EIS) has completed the draft phase, it continues on to the final phase.

The Draft EIS, released last year, outlined how more than 70,000 people would be moving to Guam within the next four years.

The plan also includes dredging acres of coral reef in Apra Harbor to make way for a nuclear aircraft carrier further inside the harbor.

The commenting period on the Draft EIS closed in February.

The next step in the planning process includes the Final EIS. The Final EIS is required by federal law and must include the comments collected during the Draft EIS phase. The comments will be noted and addressed in the Final EIS.

Typically a Final EIS will be open for commenting for 30 days.

Residents are encouraged to take a good look at the Final EIS and stay informed about the military buildup.

The Bureau of Statistics and Plans will be conducting multiple outreach events about the buildup when the Final EIS is up for review. These events are expected to include information about what residents can do to voice their opinion and help shape the plan that will impact Guam for the rest of this generation.

STAY INFORMED
- For information about the Draft EIS and a booklet about commenting, visit www.bsp.guam.gov
- You can also visit DoD's site for the latest documents regarding the buildup at www.guambuildupeis.us

Most fires set on purpose


Todd

the flames have been extinguished.

"When the trees and grass are dead, there is nothing to hold soil in place," Todd explained. "By the time rainy season gets here, the soil is easily turned into mud and washes down the river."

One of the main reasons Guam's coral reefs are in decline is because of this mud flow.

"We are basically burying our reef alive," Todd explained.

Look for more information about stopping fires with the Na Para I Guafi campaign during the upcoming months.

TOP 3 THINGS YOU CAN DO TO STOP FIRES

1 - Use something else instead of fire, especially during dry season

2 - If you burn, always follow Guam's fire rules

3 - Report fires by calling 911.

Mud kills corals

Try something new instead of burning

ON THE NET
www.stopthefiresguam.com
www.compostinstructions.com

AGAT - Areas that burn become mud factories when it rains. Red dirt mixes with the rain and rushes down the river into the ocean.

This can mean bad things for our coral reefs.

One of the major threats to our coral reefs is being buried by mud from the hills.

When the coral is buried, it cannot get food. Animals that don't eat, starve and eventually die. How do we stop this from happening?

Try Something New

Burning isn't the only way to get rid of excess yard wastes.

Mulching and composting are easy to do, don't create air pollution and help your yard!

Composting

Instead of burning, make a tall pile of the yard waste in the back yard and add in the kitchen wastes (no meat though!).

Make sure the pile stays moist and mix it around every couple days. In no time at all, the wastes will break down and leave a rich compost that can be used to enrich soil!

Mulching

Mulching is another great way to get rid of excess branches and larger yard wastes.

Yard Tip

Native trees are more fire resistant than grasses or other plants. Growing native trees in your yard can help protect from wildland fires. You can get free seedlings from the Forestry Division by calling 735-3951.


Land washing away: Red dirt is exposed as it washes away.


Dirty water hits the ocean: Mud from the hills above Agat spills into the ocean. This mud eventually settles on the coral and kills it. Stopping arson and wild land fires will help stop mud from ending in the ocean.

Mafuti in unprotected areas grow faster yet few fish are old enough to reproduce

Fish inside Marine Protected Areas are significantly older and do not grow as fast; possibly due to larger population

MANGILAO - A recent study of Mafuti on Guam found that even though fish outside of protected areas grow much more quickly than those inside the preserve, there are very few fish outside of the preserves that are large enough to reproduce.

The research looked at Mafuti in four areas around Guam. Two areas are Marine Protected Areas (MPAs) and the other two areas were not protected.

"I spent many hours looking at two bones called otoliths," ecologist Brett Taylor, graduate of UOG's Marine Laboratory said.

"These bones sit under the fish's brain and show how it has grown in little rings," Taylor said. "It's similar to the rings in a tree trunk, except it's a fish bone"

These bones showed that fish inside the Marine Protected Areas grew more slowly than fish outside of the preserve.

Why? "It's possible that because the larger fish in the preserves are protected and are not fished out of the population, the smaller fish can take their time in growing up," he said. "I know there are more scientists interested in figuring out whether or not other types of fish grow differently depending on if they are in an MPA or not," Taylor said.

Looking at fish bones: Researcher Brett Taylor studies a fish specimen trying to determine how old the fish was.

Fishermen urged to leave HUGE Mafuti, take only large fish

Fishermen are encouraged to catch and release huge mafuti so Guam has more in the future.

Older, larger Mafuti can make millions of fish in a year. Smaller Mafuti may provide almost as much meat, but can't have as many babies as one huge Mafuti.

By taking large, but not huge, Mafuti, fishermen can ensure that there will be some fish left to have millions of babies.

Big fish means more eggs

Mafuti, contd. from Pg 1

because they are an important food fish to the people of Guam. They are also an important cultural fish on the island.

He looked at how many Mafuti lived in areas inside a preserve and outside of the preserve. He also studied how many of those fish were able to have babies.

"It was very clear there were more fish inside the preserve that could spawn, or have fish eggs," Taylor said.

This research shows how stable protected areas help fish populations grow and increase the number of a particular type of fish in Guam's waters.

Mafuti are snapper-like fish that dig through the sand to find spineless animals to eat. Guam has about 16 different types of Mafuti.

These fish have an amazing ability to rapidly change their colors

Taylor plans to continue his research about reef fish in Micronesia. He is currently looking at movement and gender change in parrot fish.

Happy to lend help with a spray can: Students from GW's Marine Mania group celebrate after spending a day stenciling storm drains. They paint the storm drains to remind residents not to use the drain to dump oil, gas, grease, pesticides or other dangerous chemicals. These dangerous items can poison our drinking water and ponds.

Stopping pollution drain by drain

DEDEDO - Armed with cans of spray paint and determination, a group of students took to the streets to remind us not to dump nasty things down the storm drain.

Students from George Washington High School Marine Mania have continued their project to stencil all the storm drains on Guam.

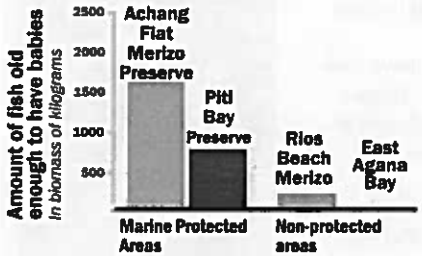
They mark the drains with red and white reminders to not dump anything down the storm drain.

Dangerous chemicals like oil, gas, paint, and pesticides that are poured down the drain eventually end up in Guam's drinking water or ponds.

Drains stenciled	
2001 -	145
2002 -	82
2004 -	139
2005 -	158
2006 -	142
2007 -	123
2008 -	195
2009 -	143
2010 -	118
Total -	1245

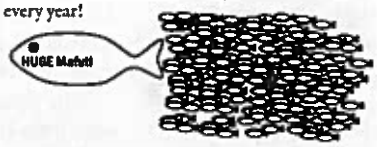
showing the numbers

Few Mafuti outside preserves live long enough to begin reproducing. The graph below shows the amount of Mafuti found in each area that are large and old enough to have baby Mafuti. If Mafuti are not living long enough to have babies, we will continue to see less of them, except in protected areas.

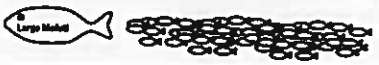


One HUGE Mafuti vs. one large Mafuti

Mafuti spawn once a month. This means one mature Mafuti can produce at least hundreds of fish once a month and possibly millions of fish every year!



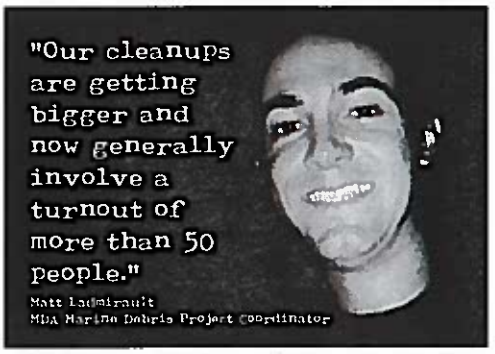
Taking an older Mafuti or many tiny Mafuti means there will be millions less fish. Fishermen are encouraged to take large, but not huge, Mafuti that have had at least one chance to reproduce. This means there will be more in the future.



Eyesore of the Month

144 bags of trash were pulled out of the river in less than 6 hours.

4,100 pounds of trash, aluminum cans and metal were pulled from the river.



Volunteers pull trash from river

Pulled from the river: The long line of trash bags waiting to be taken for recycling or disposal after being pulled from a river near Yona. Volunteers cleaned the river on May 17.

YONA - A small group of high school students, concerned citizens and scuba divers gathered in the early morning near Yona last week.

They were there for one reason - to pull mounds of trash out of the river that feeds in to the watershed of the Manengon valley.

By noon, the group had pulled more than 4,000 lbs. of metal, trash, aluminum, and plastic from a very small area.

The cleanup was organized by the Micronesian Divers Association cleanup crew led by Matt Ladmirault.

Ladmirault has been organizing cleanups since last year and has more scheduled for 2010.

Cleaning the rivers is an important part of keeping our freshwater and ocean clean.

The next cleanup will be May 8.

HOW TO GET INVOLVED

If you would like to get involved with these cleanups:
- E-mail cleanupguam@gmail.com
- Join the MDA Cleanup Crew on facebook, or
- Call Micronesian Divers Association at 472-6321.

Guardians of the Reef set out on the road

HAGATNA - A group of dedicated high school students have been hitting the road recently with a message for every 3rd grade student on Guam.

Guardians of the Reef travel to every public 3rd grade class room to teach their fellow students about the importance of coral reefs for Guam.

The Guardians teach a short lesson, have a game or craft for the younger students and always end their presentation by having the students pledge to take care of the reef.

The program began two years ago and is now in full swing.

Two participating high schools, Simon Sanchez and George Washington, have selected their finest students to lead the program this year.

The groups have traveled from H.S. Truman in Agat to Finegayan in Dededo and every school in between.

The program will potentially be expanded for 5th grade students next year.

Environmental trainings completed

TUMON - Environmental regulators, members of the Department of Defense and others involved with environmental protection on Guam recently completed several trainings on Guam.

One of the trainings dealt with environmental justice issues and working within communities to achieve participation in conservation.

The other training focused on meeting Federal Consistency Laws.

Both trainings were organized and paid for by the Guam Coastal Management Program of the Bureau of Statistics and Plans and NOAA.

"Having trainings is very important to ensure our staff is well-prepared to deal with the issues at hand," GCMP Administrator Vangie Lujan said.

"We have many current and upcoming environmental issues we need to handle. It is important we meet those challenges prepared," she said.

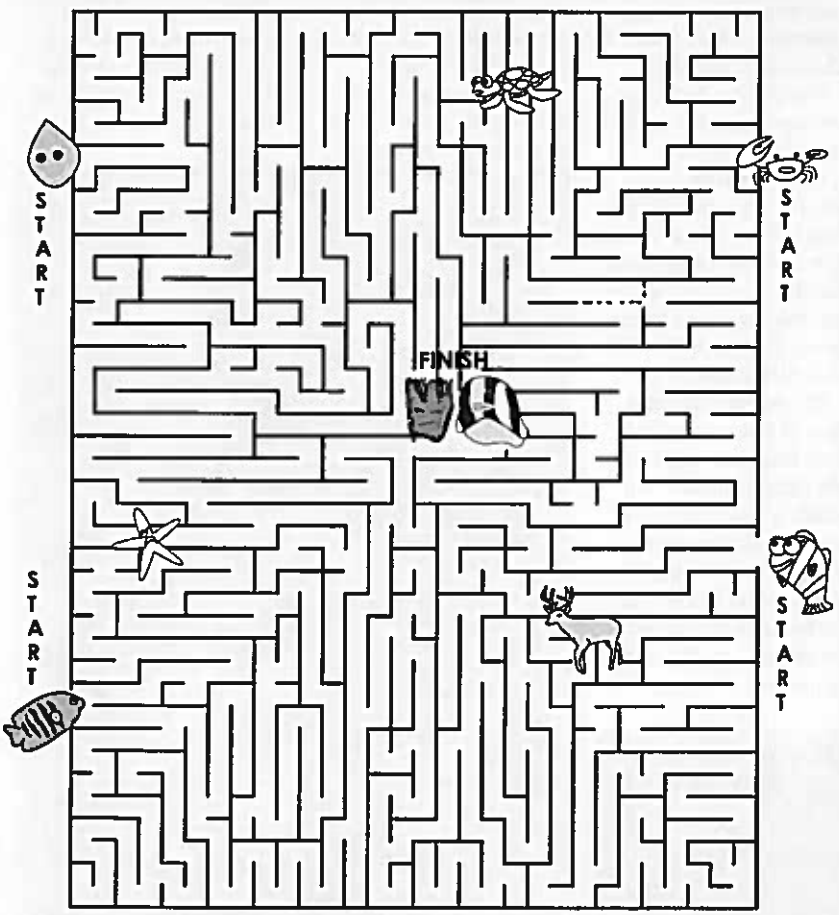
KIKA CLEARWATER PAGE FOR KIDS!

Hi Kids, I'm Kika Clearwater. Today we are going to learn about the Mud Monster and his pal Flames. These two mean guys only visit Guam when someone invites them by lighting a fire.

Fire hurts trees, animals and even the coral reefs. Make sure to tell the police or fire department if you ever see a fire.

KIKA SAYS:
"Never ever start a fire. They can hurt trees, grass and even coral!"

help tun hanom and kika stop FLAMES and the MUD MONSTER!



DIRECTIONS
Connect Tun Hanom, Kika Clearwater, Frank the Flame Angelfish and Lao the Fiddler Crab to Flames and the Mud Monster.

Ask Kika

Dear Kika:

I heard that fires kill animals and trees. The other day I saw my uncle lighting fires along the hill. What should I do?
Sincerely, Confused in the South.

Dear Confused,

You are right that fires are very bad for Guam. When fires kill the trees and grass, it causes mud to go down the river.

That mud covers the coral reef and kills it. That hurts fishermen. The mud also makes the drinking water dirty and it takes a lot of work to make it clean again.

The next time you see your uncle doing something like that, tell him what you know about fires on Guam. Remind him that fires hurt everyone including you.

If that doesn't help, ask another adult to help you talk with your uncle.

The more people know about how bad fires can be, the more we all can help take care of our island, hills, trees, grass and animals together. Thanks for writing!

KIKA CLEARWATER

What is my name?

If you know the name of this Guam animal, email it to kikaclearwater@gmail.com for a chance to get your name in the next Man, Land and Sea.

YOU CAN MAKE A DIFFERENCE

PEOPLE THAT ARE MAKING A DIFFERENCE

Roque Rosario - Liberation Day means Recycling!

TIYAN - Roque Rosario is a 21-year-old graduate that spends his Fridays during the summer months getting his hands dirty.

Rosario started volunteering for environmental events through the environmental club Marine Mania at George Washington High School.

"I joined Marine Mania because my friends were going to join. We had nothing else to do at lunch," Rosario said.

Now, after years of volunteering, Rosario is typically an attendee at many environmental events.

Every Friday during the Liberation Day carnival you can find him at the grounds helping collect aluminum cans, plastic bottles, glass and metal. Not only does he bring himself, he brings many of his family members.

"When I volunteer for the carnival I usually take my nieces and nephews so the public can see them helping the environment too," Rosario said, adding "their favorite spot is by the snow cone because the vendors sometimes give them a free drink."

VOLUNTEERING IS EASY

If you would like to help recycle at the Liberation Day Carnival or Parade call Peggy Denney at 483-9415 or email tammyjoanderson.taft@gmail.com

After a good night of recycling Rosario's family and teacher Linda Tatreau stop for a photo with a set of recycling bins at the 2009 Liberation Day Carnival.

ENVIRONMENTAL TIP

Use compost instead of fire

HAGATNA - Dry season is here and now, more than ever, residents are encouraged to use compost instead of fire.

Composting is simply putting things like banana peels, green waste and coffee grounds outside in a pile.

These natural materials will breakdown naturally and create compost that can be used in gardens, flower beds or other areas around the yard.

For those who want to speed up the process, bacteria and some equipment can help your compost pile be ready for use much sooner. This season, use nature instead of a spark.

HOW TO COMPOST

Check out www.stopthefiresguam.com for more information about how to compost.

Size Matters when fishing

A new poster set and other materials will help fishermen manage Guam's fish stocks responsibly.

The poster set displays what size a fish should be if it caught and taken.

Fish should be taken only after they have had the chance to reproduce at least once. If fish are only taken after they have had fish babies, there will be a greater chance that population of fish will increase.

The poster is the first piece of a new campaign about taking the right size fish. Other materials will include a waterproof ruler with information about common species caught around Guam. There will also be additional information about Guam's fishing regulations.

The posters, rulers and other information will be available to all residents of Guam free of charge.

"It is very important we have fish for the future. As an island, we depend on fish and this information will help ensure fishing is something our children and grandchildren will be able to enjoy," said Vangie Lujan, administrator of the GCMP.

TO GET A COPY OF THIS POSTER

Send an email to valerie.brown@noaa.gov. For more information about the Size Matters campaign visit www.guamenvironmentaleducation.com.

Upcoming Events

Saturday, May 1 - Wildlife Festival at Skinner Plaza
Saturday, May 8 - Beach cleanup with the MDA crew
Sunday, May 9 - Spoil your mom on Mother's Day
Saturday, May 22 - Beach cleanup with the MDA crew
Friday, May 28 - Recycling at Relay for Life at UOG
Sunday, May 30 - See the ocean. Swim to Cocos with the 20th annual Cocos Crossing Race
Saturday, June 12 - Beach cleanup with the MDA crew
Sunday, June 13 - Enjoy one of Guam's best natural foods mangos at the Agat Mango Festival.
Monday, June 14 - Chief Gadao Cultural Camp begins.
Late June - Recycling at the Liberation Day Carnival begins

Man Land and Sea

Volume 3 - Issue 3 - Fall 2010

SPECIAL REPORT

Natural resource agencies concerned with buildup plans

HAGATNA - The impending military buildup will greatly impact Guam's environment, according to natural resource agencies.

The Final EIS outlined the plan for the military buildup and according to many natural resource agencies and government officials, the plan wasn't complete enough to fully protect Guam's natural resources.

"Although the Final Environmental Impact Statement (FEIS) represents an improvement over the Draft Environmental Impact Statement (DEIS), many issues of concern remain," wrote Bureau of Statistics and Plans Director Tony Lamorena in the Bureau's comments to the Final EIS.

"The identification of quantifiable impacts on specific natural resources, appropriate mitigation for numerous environmental and socioeconomic impacts and other serious questions are only cursorily addressed, or not addressed at all, even in the FEIS. This shallow analysis of potentially serious impacts underscores the great difficulty in attempting a project of this size in the artificially compressed timeline insisted upon by the Department of Defense (DoD)," he continued.

Many other leaders expressed similar concerns in their responses to the Final EIS.

MORE INFO ON Pg. 3

Residents asked to monitor developments

YONA - It's already happening. Ground is being cleared. Trees are being cut down. Foundations are being laid.

Construction on Guam is underway. The flurry of activity has prompted Guam's natural resource agencies to ask residents to keep a sharp eye out for any irregularities they may see.

"Every project has to get a permit that outlines the construction work and what must be included to protect the environment," said planner Ray Caseres. "These permits are reviewed by the Guam Coastal Management Program, Guam EPA, the Department of Public Works and other agencies before they are issued."

Although the regulatory agencies have inspectors, every little bit helps.

Caseres said residents can call DPW at 646-3131 or Guam EPA at 475-1658/59 to report violations.

Artwork Credit
Dave Burdick

Affected species - This photo of atuhong or bumphead parrotfish was taken at the Great Barrier Reef in Australia. The atuhong are an example of a slow-growing large fish that used to be a common fish, but now is rarely seen in Guam's waters. They sleep in deep water that can be accessed by spearfishermen using SCUBA equipment.

Data shows SCUBA spearfishing has caused iconic species to be on verge of local extinction

HAGATNA - SCUBA spear fishing reduces the number of fish eggs released every year because the method targets large fish that are easy to catch while they sleep.

Without eggs from the larger fish, like Atuhong, are on the verge of being extinct in local Guam waters.

According to data collected during the past 30 years, spear fishing using SCUBA gear, or diving gear, has caused the decline of one of Guam's iconic fish, the bumphead parrotfish or Atuhong.

At night, Atuhong sleep in open areas and are easy to catch with a light and the help of SCUBA gear.

Data shows the last Atuhong recorded catch was in 2001 and with the help of SCUBA equipment.

Atuhong are now on the verge of being extinct in Guam's waters according to the University of Guam Marine Lab.

A recent study by Dr. Jennifer McIlwain at the University of Guam Marine Lab found no atuhong even after surveying 16 kilometers of coral reef at 18 sites around Guam.

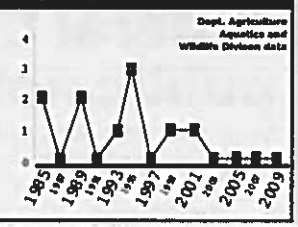
"We are concerned that the population of atuhong may be so low it will not be able to recover," McIlwain said.

"We are also not seeing juvenile atuhong which is a cause for concern," she said.

MORE INFORMATION
SCUBA spear - Pg. 4 - 5

Reported Atuhong catch for past 25 years

Atuhong are a large, slow-growing fish that take a long time to reproduce. If too many large adults are caught there is a chance the population will never recover because there are no fish old enough to spawn.



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Santos Park gets an environmentally-friendly upgrade.
Page 2

Our Coasts. Our Future.

MAN LAND AND SEA

A message from the Director

Hafa Adai and thank you for reading Man, Land and Sea this month.

During the past year our island has been acutely focused on the drastic changes in our future.

Guam in a decade will be very different than it is today.

These changes can be good if done in a responsible and progressive manner. If not, they may be very harmful to our fragile ecosystem.

I encourage everyone to look at the proposed changes from the buildup, private developers and in our government to make sure these changes are positive for our island.

Sincerely,
ALBERTO "TONY" A. LAMORENA V
Director, Bureau of Statistics and Plans

Santos Park getting an eco friendly facelift

PITI - Piti will have a brand new spot for parties by the end of this month. The Guam Coastal Management Program is helping upgrade a pavillion at Santos Memorial Park on Marine Corps Drive in Piti.

"This project is about offering another place for families to gather," Esther G. Taitague, planner with GCMP, said. "We are incorporating things like a rain garden and permeable walkways to allow rain to flow into the ground instead of becoming runoff that can pick up pollutants. We are using best development practices for this project."

The park is also meant to take pressure off the sea grass beds at the nearby Piti Bay Marine Preserve.

"This project was started with designs in 2008 and we hope to finish the construction by the end of September," she said.

Federal Consistency Review public notices information

Section 306(d)(14) of the Coastal Zone Management Act of 1972, as amended, requires public participation in the federal consistency review process. The Bureau of Statistics and Plans is currently reviewing the following proposals for consistency with the Guam Coastal Management Program.

1 - Yigo Guam
DPW Route 29 Rehabilitation & Widening from the Route 1 intersection to Route 1

2 - Dept. of Ag.
Installation of ten cultural educational fishing practice signs
Funded by the U.S. Fish and Wildlife Services through the Sport. Fish Restoration Fund (Oct. 1, 2008 to Sept. 30, 2010

3 - Apra Harbor
Guam Shipyard Section 401 WQC

4 - Talofofo
DPW Talofofo River Bridge & Togcha Bridges Replacements to enable the bridges to meet the full legal truck loads of refuse to the new Layon Landfill with approximately 36 tons.

The consistency determination/applications for these projects may be viewed at:

Office of Guam Coastal Management Program,
Bureau of Statistics and Plans
Suite 303, 3rd Floor,
GCIC Building
414 W Soledad Ave
Hagatna, Guam 96910


BUREAU OF STATISTICS AND PLANS
Alberto A. Lamorena V
Director


GUAM COASTAL MGT. PROGRAM
Evangeline D. Lujan
Administrator
vangelujan@yahoo.com


GCMP STAFF
Tom Quinata
Dave Burdick
Amelia De Leon
Esther G. Taitague
Terry M. Perez
Tammy Jo A. Taft
Elaina Todd
Victor Torres
Timothy Semuda
Nydia Llarenas
Raymond Caseres






CONTACT US
P.O. Box 2950
Hagatna, GU
96932
(671) 472-4201

EMAIL US AT KIKA.CLEARWATER@GMAIL.COM WITH STORY IDEAS OR COMMENTS!

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Final EIS does not address officials' concerns for buildup

The Final Environmental Impact Statement (Final EIS) for the military buildup on Guam was released on July 28 by the Department of Defense (DoD). According to federal law, the document was to include and address comments made on the draft version of the EIS.

After the document was released a 30-day waiting period began. Comments about the Final EIS and whether or not it addressed the concerns raised during the Draft EIS phase were submitted to DoD.

The following include some of the comments submitted to DoD about the Final EIS.

OROTE POINT - The military buildup includes moving Marines from Japan to Guam. The buildup plans include building housing, recreation and workplaces for the marines.

"While representatives from the federal government have spoken, publicly, of possible mitigation proposals to deal with various challenges as outlined in the Guam International Agreement, including adaptive management and force flow reduction concepts, those specific measures have not been identified in the FEIS. Identifying specific plans of actions will reduce environmental impacts, construction-related population increases, and additional pressure on our island's utilities, education, health care, and law enforcement systems"

"Moreover...it is believed that many of the issues raised during the Draft EIS process were not properly addressed or were simply ignored."
Gov. Felix Camacho
Governor of Guam

"Moreover...it is believed that many of the issues raised during the draft EIS process were not properly addressed or were simply ignored."

Gov. Felix Camacho
Governor of Guam

"In our view, while the Navy solicited public comments, it seems obvious that it did not intend to make substantial changes to the DEIS, nor did Navy intend to accept recommendations from Guam that would improve implementation of the Marine Relocation plan. It is even more so evident from our review of the FEIS, that the costs of the buildup outweigh the economic benefits."

Anthony C. Blas
Administrator of the Guam
Economic Development Authority

"For the record, the department does not support neither the methodology, nor the source of data relied upon, when conducting the Social Economic Impact Statement (SEIS)."

"For the record, once again, the contractors assigned to conduct the SEIS, did not provide for a fair means to collect reliable data and meet with key stakeholders. The apparent 'rush,' as it appears, seemed intended to complete an enormous activity within a strict time frame."

"Given the aforementioned, it is therefore the position of the department that the SEIS is not a reliable document. Thus, the department recommends that the SEIS not be included in the Record of Decision."

J. Peter Roberto
Director of Department of
Public Health and Social Service

"The military buildup will undoubtedly have a large scale impact on and strain the already taxed resources of the Judiciary of Guam. However, to acknowledge the comments and information provided in our correspondence of February 15, 2010, and then fail flatly to incorporate the information into the Final EIS is truly disingenuous and extremely disheartening."

Perry C. Taitano
Administrator of the Courts

"DPR disagrees with the Final EIS' conclusion that there will no impact to recreational resources during the construction phase of the undertaking (outside traffic delays)."

Department of Parks and Recreation
Planning Division Comments on Final EIS

"In reviewing the Final EIS, we have concluded that the statement in its current form lacks adequate mitigation response to the concerns expressed during the DEIS comment period as outlined in the NEPA process. Although we appreciate the response to mitigate some areas of concern, appropriate action to address civilian housing issues remain unanswered."

Raymond F. Y. Blas
Executive Director of Guam Housing and
Urban Renewal Authority

"The magnitude and scale of the FEIS proposed actions presents a tremendous challenge Department of Agriculture to sustain and recover Guam's natural resources. The Micronesian Biosecurity Plan and native species recovery plans must be fully funded and implemented prior to taking any of the proposed actions."

Tino Aguon
Chief of the Division of Aquatics and
Wildlife, Guam Department of Agriculture

"The following list summarizes the issues with which the Agency needs further clarification in the upcoming Record of Decision (ROD) for this FEIS, as they were NOT satisfactorily addressed: Specifically identify who will be the responsible party to fund and conduct the required environmental impact studies for the increased wastewater discharge from the existing Wastewater Treatment Plants into the associated receiving waters at or near their design capacity, but above current permitted levels. The FEIS appears to indicate that the Department of the Navy will only be a customer to GWA and hence, places the burden on that local entity."

Elizabeth Cruz
Administrator, Guam EPA

"Upon review of the Guam and CNMI Military Buildup FEIS, it is apparent that our comments have not been sufficiently considered."

Dave T. Lotz
President of Guam Boonie Stompers

Next stop on buildup road is Record of Decision

The plan for the military buildup on Guam is currently in the final stages of a process set by federal law

The National Environmental Policy Act, or NEPA, outlines what studies any federal agency must complete before actually starting work on their proposed project.

The process begins with scoping, then a Draft Environmental Impact Statement followed by a Final Environmental Impact Statement (FEIS). The FEIS becomes a signed document called the Record of Decision(ROD). This ROD is then the road map for the project.

WHERE TO LOOK FOR THE RECORD OF DECISION
- www.guambuildup.com
- guambuildupeis.us
- one.guam.gov

SCUBA spearfishing method leaves no depth refuge for fish

Depth refuge is necessary for large fish to grow and produce more fish eggs

PITI - For most of history, fish and other marine life found safety in deeper waters. In the past humans did not have the ability to breathe under water.

During the past century, humans have developed technology to breathe underwater and stay there for an hour or more. The invention of SCUBA diving gear has changed fishing forever.

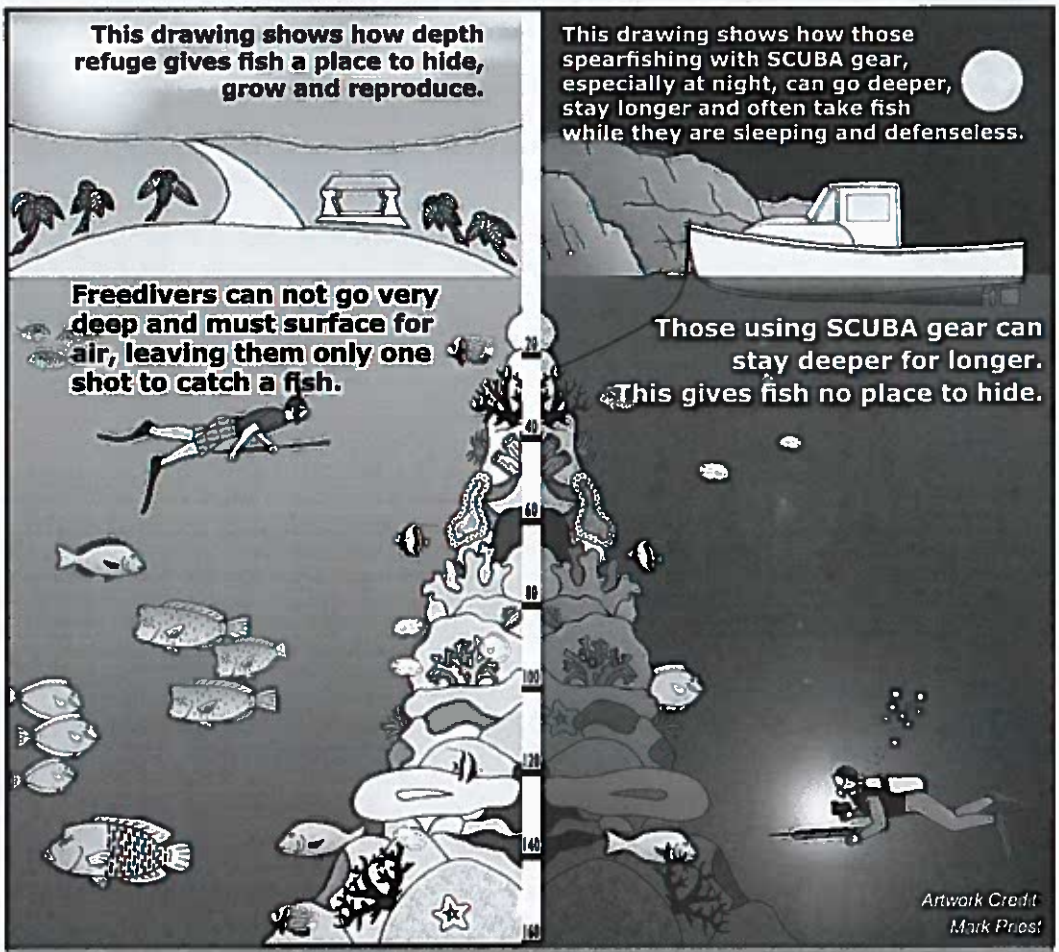
Without SCUBA gear fishermen were only able to freedive down to 60 to 100 feet for a catch. After each attempt, the divers would have to breathe for a few minutes.

With SCUBA equipment, a diver can go far deeper than a freediver and spend more than an hour below the water, depending on how much air is in their tank.

Fish that used to escape into deep water have no place to go when a SCUBA spearfisherman arrives.

Parrotfish are typically easy targets for SCUBA spearfishermen at night, which may be one factor in their decline in numbers around the island.

Parrotfish are a popular food fish, but their numbers are in steep decline around Guam. Because they are sound sleepers, it makes them an easy catch for SCUBA spearfishermen.



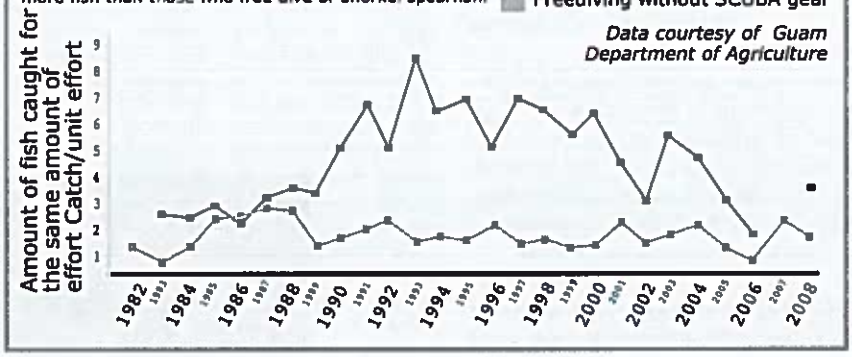
Safe place to grow - Large fish hiding below the freediver can grow and reproduce in huge numbers

No place to go - SCUBA spearfishing allows divers to take fish that are sleeping in deeper water, leaving no fish to reproduce.

Little effort, too many fish

SCUBA spearfishing allows one person to take many large fish with little effort

Spearfishing using SCUBA gear allows for a person to stay under the water longer, go deeper and take many more fish than those who free dive or snorkel spearfish.



Bill 397 aims to ban SCUBA spearfishing

Bill currently in committee waiting to be taken to the floor of the Legislature

HAGATNA - In May 2010, Sen. B.J. Cruz introduced Bill 397-30.

The bill would make SCUBA spearfishing a felony punishable by up to five years in prison, and/or a $1,000 to $5,000 fine.

The bill outlines how the decline of certain iconic species like the Atuhong, or Bumphead Parrotfish is one of the most important reasons to ban SCUBA spearfishing. The Atuhong play an important role in keeping the ecosystem in balance by eating algae.

Atuhong are also slow-growing and take a long time to reproduce.

The bill must be heard publicly before it can be voted upon by the 30th Guam Legislature.

Multiple 'tools' needed to increase the number of fish in Guam's waters

Rules about gear, protected areas and size used to manage fisheries in a sustainable way

TUMON - Any person who has fished in the waters of Guam for long enough can tell you that there are less fish today than ever before.

Increasing the number of fish in the water takes more than one type of management. Using many different regulations to help a fish population is called fisheries management.

Multi-pronged fisheries management has proven to work in other areas of the world.

Many times, the management is based on a precautionary principal. This principal assumes certain fishing or coastal activities, types of gear, or other factors have an impact until it is proven they have no impact.

This cautionary approach helps make sure communities can protect the amount of fish in their waters before the population is so low it can never recover.

Tumon Bay Marine Preserve
Dave Burdick

Join the biggest cleanup of the year on the 25th

DEDEDO - Every year volunteers pull thousands of pounds of trash out of the ocean, rivers and from the beaches of Guam.

This year it is your turn to make a difference.

The International Coastal Cleanup is a worldwide event. Volunteers around the globe cleanup their areas and help reduce the amount of trash that becomes marine debris.

Marine debris, or trash in the ocean, is dangerous for sea life. Turtles mistake plastic bags for jellyfish and get a stomach full of plastic. Sharks get caught in nets left behind and suffocate.

The best thing about marine debris is that it can be prevented. We can stop it from happening by picking up trash at the beach and helping out at events like the Coastal Cleanup.

There are more than a dozen sites you can volunteer at this year. Volunteers are encouraged to bring water bottles.

For information about the Coastal Cleanup call the Guam Coastal Management Program at 475-9668/6.

GCMP File Photo

HOW TO VOLUNTEER

Saturday. Sept. 25, 2010

- 7 a.m. - Show up at one of the following locations: Ipan Beach Park, Tagachang Beach, UOG Marine Lab, Tanguisson Beach, Dungca's Beach, Masso Reservoir, Paseo, Pago Bay, Inarajan Bay, Merizo Shore, Umatac Bay, Marbo Cave, Asan Shore, Piti Shore, Agat Beach or Oka Point
- Bring a water bottle and gloves if you have them. Get ready to volunteer!

Many Pacific Island nations outlaw SCUBA spearfishing

NEIGHBORS SAY NO TO SCUBA SPEARFISHING

SCUBA spearfishing is banned in many places in the world including Palau, CNMI (Saipan, Rota, Tinian), Fiji, Tonga, American Samoa, Western Samoa, Solomon Islands, Mauritius, Kenya, Maldives and most of Australia.

MICRONESIA - Many islands across the Pacific Ocean have banned spearfishing using SCUBA gear because it is too effective.

SCUBA spearfishing can result in overfishing. Overfishing causes a population of fish to go down rapidly.

Many fishermen and scientists across the Pacific agree that SCUBA spearfishing is not a sustainable way to fish. Many countries noticed huge drops in their fish stocks after SCUBA spearfishing was introduced. Soon after the push to ban this method started.

SCUBA spearfishing is also banned because it targets fish who are sleeping and helpless. Parrotfish and other types of fish sleep in caves during the night.

SCUBA spearfishermen often use a flashlight to find the sleeping fish and spear them without any chance for the fish to escape.

In addition to the threat SCUBA spearfishing poses to fish populations, it also puts fishermen at risk. Once shallow waters are overfished, spearfishermen are forced to go deeper in the water to get the same amount of fish.

The deeper the diver goes, the more dangerous the dive becomes. Many SCUBA spearfishermen on Guam have been treated for decompression sickness which is caused by going deep in the water and staying too long.

Few use SCUBA gear; make it harder for majority of fishermen

SCUBA spearfishing equipment is expensive and many fishermen know it is not right to take as many fish as you can. For these reasons, and others, the majority of fishermen do not use SCUBA equipment to fish.

SCUBA spearfishing is also not a traditional method of fishing.

U.S. Coral Reef Task Force comes to Guam

TUMON- The United States Coral Reef Task Force (USCRTF) was established in 1998 by Presidential Executive Order to lead U.S. efforts to preserve and protect coral reef ecosystems. The USCRTF includes leaders of 12 Federal agencies, seven U.S. States, Territories, Commonwealths, and three Freely Associated States.

This group will be meeting on Saipan next week. There will be a pre-meeting on Guam starting today. The USCRTF helps build partnerships, strategies, and support for on-the-ground action to conserve coral reefs.


Artwork Credit: Dave Burdick

Friday, Sept. 10
Information Briefing: The Military Build-up and Guam's Coral Resources
10 a.m. to 12 p.m.
Hilton Hotel Tumon
This information briefing is open to the general public for observation. It is not an opportunity for public comment.

Field Trips: Asan/Piti Watershed and Cetti Bay
1 p.m. to 4 p.m.
To register for these field trips email tammyjoanderson. taft@gmail.com

Saturday, Sept. 11
Field Trips: Masso Reservoir
5 p.m. to 6 p.m.
To register for these field trips email tammyjoanderson. taft@gmail.com

Sept. 15 - Sept. 16
Business Meeting
The business meeting will be in Saipan.
Residents of Guam will have a chance to participate via live streaming during the public commenting period from 1 to 2 p.m. on Wednesday. Email tammyjoanderson. taft@gmail.com for more information.

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Organazations are part of the U.S. Coral Reef Task Force including:

U.S. Federal Members
- Dept. of Commerce
- Dept. of the Interior
- U.S AID
- Dept. of Agriculture
- Dept. of Defense (Navy and Army)
- Dept. Homeland Security/U.S. Coast Guard
- Dept. of Justice
- Dept. of State
- Dept. of Transportation
- U.S. EPA
- NASA
- National Science Foundation

State/Territory Members
- Puerto Rico
- CNMI
- Hawaii
- Florida
- American Samoa
- Guam
- U.S. Virgin Islands

Non-Voting Members
- FSM
- Marshall Islands
- Palau

For more information about the Task Force meeting email vangelujan@yahoo.com

Clinics, gear for hunters offered later this month

MERIZO- The Na Para I Guafi southern watersheds campaign in partnership with the Guam Coastal Management Program are pleased to announce a new event for Guam's hunting community.

The Hunting Expo will feature presentations by local hunters about hunting in Guam. It will showcase new hunting tools for Guam and feature interactive do-it-yourself displays. Tons of free giveaways will be available for those who participate including cool camouflage gear and hunting accessories. The Expo is open to the anyone who would like to attend.

"We are really excited to be hosting these Expos," said Elaina Todd, campaign manager. "It is our goal to provide a place for hunters to see what types of tools are available to them to encourage more sustainable hunting in southern Guam- and the camo stuff is pretty cool too!"

Todd says that the Expos are being hosted in Southern Guam villages to attract hunters that may not make it to other hunting trainings or events and to encourage dialogue among the hunting community.

The Expos will be held from 6-8 p.m., and three expos are scheduled to accommodate all who would like to attend.

Space at the Hunting Expos is limited. Those interested in attending or who would like more information should contact Elaina at 475-4468 or guamwatersheds@gmail.com.

HUNTING EXPOS

6 p.m. to 8 p.m.
- **Fri. Sept. 17** at the Agat Community Center
- **Wed. Sept. 22** at the Inarajan Community Center
- **Wed. Sept. 29** at the Merizon Senior Citizens Center

SPACE IS VERY LIMITED
Call 475-4468 or email guamwatersheds@gmail.com if you would like to register.


Artwork Credit: Elaina Todd

HUNTING - A hunter finds a new location to search for deer in the southern mountains of Guam.

Kika Clearwater's Page for Kids!

Hi Kids, It's Kika Clearwater again! I hope you had a good summer out in the ocean.

This month we are taking a look at easy things we can do to care of our fish and coral reefs. Did you know that we have more than 300 types of coral on Guam and more than 1,000 different fish! Let's do our part to keep them around!

KIKA SAYS:
"Get in the water and see all the cool fish and corals we have here on Guam! And remember, look, don't touch!"

Kika's word search

S	N	E	V	M	E	R	S	T	E	P	O	F	M	N	A	C	O	R	A
L	E	V	C	S	A	L	O	C	E	A	N	I	I	Q	A	F	H	F	B
Z	T	V	T	W	T	R	L	D	S	W	A	S	W	O	A	R	Z	A	X
L	T	P	R	M	X	B	I	X	I	E	J	H	S	U	R	L	A	D	W
G	O	W	V	E	C	Z	T	N	U	L	S	S	X	R	N	C	Z	U	O
F	E	S	M	W	S	J	T	Y	E	T	L	E	A	A	H	C	K	Z	Y
K	R	X	J	A	U	E	E	K	T	R	H	W	A	V	O	K	T	O	J
C	S	A	C	M	T	J	R	F	A	U	I	A	B	W	J	E	A	F	B
C	N	B	A	P	M	S	Z	P	T	T	V	C	E	W	R	O	F	Q	T
D	C	T	K	O	X	P	N	J	A	E	Y	H	X	L	C	T	Q	A	N
C	A	J	D	N	G	Q	G	O	G	H	N	Y	W	A	O	F	H	Q	W
C	O	P	R	P	L	W	P	X	A	J	P	F	F	T	U	N	B	P	X
R	B	R	E	Q	U	K	M	K	K	Z	Q	E	Q	S	C	C	U	Y	B
L	D	E	A	V	Y	N	S	Z	K	X	U	E	C	A	O	J	C	I	T
O	M	C	M	L	O	Q	A	B	N	D	G	R	X	O	M	Z	C	J	G
L	O	Y	M	P	O	R	M	E	E	H	U	M	H	C	B	Z	L	P	C
O	E	C	I	Y	D	U	O	E	L	D	A	M	P	Y	I	M	A	P	U
G	W	L	E	L	B	L	G	G	K	C	M	A	S	J	X	K	K	Z	Y
U	Y	E	N	O	D	B	C	S	E	O	Z	B	F	K	P	U	I	Z	H

Coastal
Cleanup
Coral
Fish
Guam
Litter
Marine
Ocean
Polyp
Preserves
Recycle
Reef
Sea
Swim
Tataga
Turtle
Umatac

Answers are on the bottom of the page

Decode Kika's secret message by unscrambling the bolded letters in the word search above.

Connect the dots!

Coastal Cleanup is on Sept. 25, and is your chance to help clean up trash on Guam! Get your friends and come help.

I am going to Coastal Cleanup

ASK KIKA

Dear Kika:

I was swimming in the ocean last weekend when I saw some people standing on top of coral. Is it okay to stand on the coral? If it's not okay, what should I do?

Sincerely,

Swimmer in the Sea

Dear Swimmer,

Standing on coral can kill the tiny coral animals that make up the large coral colony.

Think of it like this: One human standing on top of a coral is like one elephant standing on top of a human. That doesn't sound comfortable at all!

Standing on coral can kill our reef so next time you see that happen you can do a few different things.

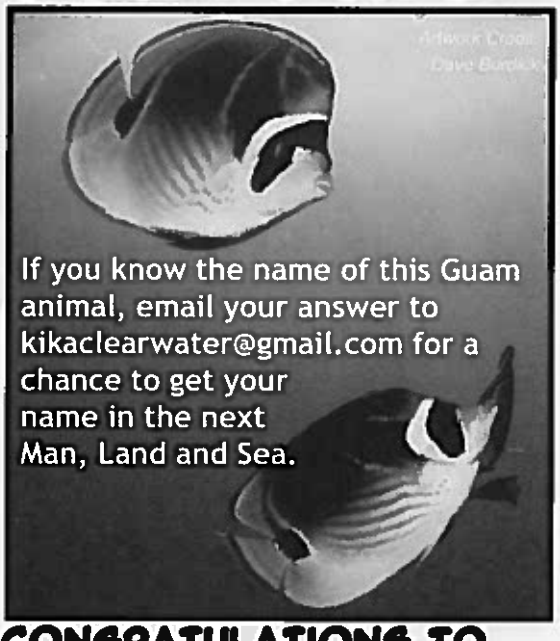
If you know the person standing on the coral, you can tell them they are standing on millions of tiny animals and it is hurting them.

Or you can tell your parents about the coral and why it's important for the person not to stand on them. Either way, you are doing the right thing and saving our coral reef!

Thanks for writing!

KIKA CLEARWATER

WHAT AM I?



If you know the name of this Guam animal, email your answer to kikaclearwater@gmail.com for a chance to get your name in the next Man, Land and Sea.

CONGRATULATIONS TO LAST ISSUE'S WINNERS WHO CORRECTLY IDENTIFIED THE MICRONESIAN KINGFISHER.

Annie Fejeran
Evelyn Quiel
Mhiko Carlos

Answer - Never step on a coral

YOU CAN MAKE A DIFFERENCE

PEOPLE THAT ARE MAKING A DIFFERENCE

Recycling is a group effort at GW

Dewitt, Pyramid, Guahan, Coast 360, Girl Scouts and iRecycle sponsor recycling at George Washington HS

MANGILAO - Marine Mania, the Marine Biology Club at George Washington High, has been recycling aluminum, plastic, cardboard, paper, toner cartridges and six-pack plastic rings at the school for 16 years.

Recycling aluminum is the easiest for the group. There is always a market for it and recycling companies on Guam always take it. The start of the iRecycle program made recycling aluminum even easier by providing a bin at the Mangilao campus.

Recycling plastic is more of a challenge. It is not profitable to send plastic off-island for recycling, in fact, it is a money-losing proposition. Fortunately, for several years, Pyramid Recycling has accepted the loss to help Guam do the "right thing."

One-use plastic drink bottles have become very popular on island. Marine Mania recycles an average of three cubic yards of plastic every week. The group does this with the help of their enthusiastic advisor who drives a long-bed pickup truck and makes the trip to Pyramid every week.

By law, cardboard must be sent to the recycler. GWHS generates about two cubic yards every three weeks. Guahan Waste Control has generously waived the fee for the high school group because they are a non-profit environmental organization with limited funds.

Until two months ago, the group sent toner cartridges off island. Most Guam companies import these for sale but do not accept the responsibility of dealing with empty cartridges. Postage was expensive. Fortunately, Cartridge World has opened on Guam and accepts most brands.

Marine Mania collects six-pack rings to give to the Girl Scouts. The girls send these off-island where they are made into new rings.

Paper has always been the biggest challenge. In the 1990s it was profitable for recyclers to send paper to Taiwan. They couldn't pay Marine Mania for the paper, but they could make a small profit. The paper had to be sorted by type and color, and then boxed.

Today, it is not economically feasible to send paper off-island, but shredded paper is used by Guam farmers. Paper put around plants holds moisture, reduces weeds, decomposes rapidly and improves soil. Shredded paper is also used by pig farmers in the pig pens. Coast 360 employees spent several hours shredding Marine Mania's first 30 boxes of paper. Dewitt Shredding Services is now in partnership with Marine Mania and brings their mobile shredding machine to GW on an monthly basis.

Photo Credit: Linda Tatreau

A full recycling load: Janessa Fejeran and Natividad Rosario (Front) with (Back) Jalene Fejeran, Kimberly Dolores, Giordon Weathington & Chris Dolores

Shredding the paper: Jalene and Janessa Fejeran work the paper shredder.

New fishing rulers out

Rulers help fishermen catch only fish that have already had a chance to reproduce; may increase fish populations

A new free ruler will help fishermen manage Guam's fish stocks responsibly.

The rulers show what size a fish has to be before it can reproduce.

Fish should be taken only after they have had the chance to reproduce at least once. If fish are only taken after they have had fish babies, there will be a greater chance that population of fish will increase.

The ruler is the second piece of a new campaign about taking the right size fish.

FISHING POSTERS REQUESTED AFTER THE LAST MAN, LAND AND SEA WILL BE DISTRIBUTED WHEN THEY ARE PRODUCED.

HOW TO GET A FISHING RULER

Send an email to valerie.brown@noaa.gov or tamuyjanderson.tafa@gmail.com or visit the Guam Coastal Management Offices on the 3rd floor of the GCIC building in Hagatña.

Upcoming events

Friday, Sept. 10
U.S. Coral Reef Task Force pre-meeting on Guam

Sept. 13-17
U.S. Coral Reef Task Force meeting in Saipan

Saturday, Sept. 25
International Coastal Cleanup on Guam

Mid September
3 Hunting workshops. Email elainatodd@gmail.com for more information

Sunday, Oct. 3
Fire Prevention 5k

Late December
Splashin' in the Sea event for families

MAN • LAND • SEA

News of Guam and her Ocean Environment

Volume 3 • Issue 1 • Spring 2010

In this issue

Draft EIS special

The Man, Land & Sea Newsletter is funded by a grant from the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) through the Coastal Management Act of 1972, as amended, administered by the Office of Ocean and Coastal Resource Management Program (OCRM) and the Guam Coastal Management Program (GCMP) of the Bureau of Statistics and Plans, Government of Guam through Grant Number NA09NOS4190175

Speaking out: Southern High student Reinhard Alcampor speaks at the youthspeak 2010 event

Giving the community a voice

What - A telethon for Guam with information about the Draft EIS

How can I see it? - Watch PBS Guam from 7 to 10 p.m. Thursday, Feb. 11

Can I comment? - Callers can comment over the phone or at their mayor's office

Learning about the changes coming to our shores has never been easier.

Tonight, Thursday, Feb. 11, PBS Guam will be airing a telethon to raise comments about the Draft Enviornmental Impact Statement.

"The most important action our people can take right now is to submit a comment," said Alberto Lamorena, director of the Guam Bureau of Statictics and Plans. "By law, any comment submitted about the Draft EIS must be addressed by the Department of Defense."

"Our goal is to raise as many comments by the people of Guam as possible," he said.

During the telethon, experts will be answering questions about information and plans in the Draft EIS.

Residents can call into the telethon with their questions or comments.

The telethon is part of the ongoing "Our Island. Our Lives" campaign coordinated by the Office of the Governor, PBS Guam, the Bureau of Statistics and Plans, the Coastal Management Program along with the Guam Buildup Office.

"This campaign is a massive effort to inform the people of Guam about the proposed changes on Guam outlined in the Draft EIS," Lamorena explained. "We want people to think about these changes and comment before the deadline next week."

The Draft EIS has been under review by local and federal scientists, government officials and concerned citizens since November.

All comments on the Draft EIS are due on Wednesday, Feb. 17, 2010.

Information about the buildup and forms to help residents comment can also be found at mayor's offices around the island.

OUR ISLAND OUR LIVES

making effective comments

Our Coasts. Our Future.

Issues of concern with the Draft EIS and comment guide

This book is provided to help the people of Guam make effective comments on the Draft Environmental Impact Statement (Draft EIS).

It is a reference that is also available at the mayor's offices and on the 3rd floor of the GCIC building in Agana at the Guam Coastal Management Program.

This book includes specific information about the Draft EIS that will help the people of Guam make specific and effective comments.

The final pages provides a form residents can use to submit comments before Wednesday, Feb. 17.

This can also be found online at www.bsp.guam.gov.

OUR ISLAND OUR LIVES
making effective comments

Making an effective comment

Comment with purpose

How to make a comment

This book is to help people of Guam make effective comments on the Draft Environmental Impact Statement.

Our island has until February 17, 2010 to make any comments. Regardless of what happens, we may never be lawfully given another time to comment on the buildup.

Everyone is encouraged to comment regardless of views, age, race or any other factor.

It is our hope the people of Guam can make comments that will make a better future for our island. Comments are best when they are specific. Being specific can make comments more effective.

Comment examples

IF YOU MAKE A BROAD STATEMENT

- If you make a broad statement like "The military should not impact cultural sites"
- The response in the Final EIS may be, "Comment noted."

COMMENTS NEED TO BE DESCRIPTIVE, AND FOCUSED

- The Pagat site is critical to our heritage. Military should not impact the Pagat cultural site related to operation of the firing range.

THE MORE DESCRIPTIVE, FOCUSED AND CONSTRUCTIVE, THE BETTER

- The Pagat site is critical to our heritage. The following changes in the action are needed by the military to ensure our heritage is preserved. The trail to site needs to remain open with access to residents of Guam provided at least one day each week.

WHERE TO SUBMIT THIS FORM

Comments can be submitted in writing, by mailing this form to:

JGPO c/o NAVFAC Pacific
258 Makalapa Drive, Suite 100
Pearl Harbor, HI 96860-3134
Attention: GPMO

Comments can also be submitted online at www.guambuildupeis.us/submit-a-comment

Comments can also be submitted at the GovGuam locations listed below where they will be collected and mailed to the above address on Wednesday, Feb. 17, 2010.

For more information call

- The Office of the Governor at 475-9473 or 475-9303.

READING THE DRAFT EIS

- Look for key words like "*may, might, should, can.*" This Draft EIS is a document that says what will be happening, not what "*may, might, should, or can*" happen.
- If there is a part of the Draft EIS you cannot understand, note that in your comments.
- If there is a part that does not make sense, make sure to state that in your comments and why it does not make sense.

Keys to making effective comments

WHEN COMMENTING

- Be specific.
- Make sure to include the page number where you found the information in the Draft EIS.
- Suggest changes to avoid or reduce the impacts
- You can ask for clarification or challenge a statement.
- Use the phrases "The Navy shall" or "The Navy will" when making recommendations. Starting a sentence with these phrases will help you focus a comment to make it very specific. Specific comments can be acted upon, not just noted.
- If the section you are reading of the Draft EIS does not seem to have enough data or information, make sure to note that in your comment.
- Provide an alternative viewpoint or suggestion. Mentioning a different option will force that idea into the review of the document.

Terrestrial/Land Issues

Background Guam has many animals that are listed as possibly at threat including coconut crab, endangered snails, sea turtles, fruit bats, Micronesia Kingfisher, the Koko bird and reef fish. There are very few of these animals remaining on Guam. The main threats to these animals are destruction of habitat, over harvesting and invasive species.

The increase in population and construction activities may make recovering threatened and endangered native species impossible due to the removal of trees and splitting of habitats.

The issue Having habitat is critical to protecting species. There are many construction projects happening on Guam that require vegetation to be cleared. Many of the projects are in separate locations. This separate clearing creates habitat that looks like "jigsaw puzzle pieces" not connected.

What does the Draft EIS state? Proposed construction activities would displace the species and other wildlife from suitable habitat in the proposed project area. The action would include removing essential habitat for the fruit bat, Kingfisher, Marianas Crow and Crow recovery zones.

Example comment The Draft EIS must specifically state what animals, trees and other organisms currently live within the project area and how many of each population will be destroyed due to the project.

The Micronesian Kingfisher is an endangered species on Guam

DoD hopes to increase its land holdings beyond their current 30% of the island to accommodate their activities through the lease of additional GovGuam and private land.

The issue To construct a firing range, the Draft EIS is proposing acquiring or obtaining a long-term lease for non-DoD lands. There are currently three DoD firing ranges on Guam.

What does the Draft EIS state? Two firing ranges are proposed for the Route 15 lands near Andersen South. The Route 15 lands are owned by private owners and GovGuam. The proposed action would include the federal government acquiring these lands through negotiation. *Volume 2, Chapter 19, Page 16*

Example comment The Draft EIS must thoroughly explore the option of utilizing current DoD lands for the proposed actions.

The increase in shipments to Guam will increase the possibility of accidentally introducing destructive aquatic and land species.

The issue One of the main concerns addressed in the Draft EIS is the Brown Tree Snake and the possibility of this invasive species exiting Guam. There is no specific information regarding the inspection of cargo and equipment entering Guam which would stop other invasive species from arriving.

What does the Draft EIS state? The main potential sources of non indigenous species to Guam include animals that inadvertently arrives with shipping traffic. Most of the marine invasive species found in Guam's waters are found in Apra Harbor. *Volume 2, Chapter 11, Page 28 - 34*

Example comment The Draft EIS must include a complete survey to determine the percentage of increase there will be for the introduction of invasive species. There must also be more information provided about the possible species that could be brought to Guam through increased shipping and construction.

Coral Reefs

Background What are corals? Corals are tiny, sensitive animals. More than one coral ploy in a group is called a coral colony and more than one coral colony is a coral reef. Corals are very slow growing. When coral colonies grow together it creates a coral reef. Reefs protect Guam from powerful waves and create a home for fish. Reefs are also a main reason tourists visit our island.

The proposed dredging project in Apra Harbor does not include a complete analysis of how the coral reefs in the area will be impacted. The plan does not mention what the dredging will do to the 25 acres of reef found right next to where dredging will occur, but which are deeper than 60 feet; these reef areas are very vulnerable to the impacts from dredging. There are an additional 70 acres of reef that may be impacted by the dredging but which are not included in plan.

Citation *Volume 4, Chapter 11, Section 11.2.2.2 (Page 45)*

Example comment DoD must include deeper reef areas (deeper than 60 feet) in the impact analysis. Data is not currently available for these areas, so additional coral reef surveys must be carried out. The results of the complete impact analysis should be provided prior to the release of the Final EIS.

A coral reef study was carried out by federal and local biologists at the same time a Navy consultant was gathering coral reef information for the Draft EIS. The study shows that information collected by the Navy consultant had significant problems. The study was included in the Draft EIS as an appendix, but the results of the study were not discussed in any detail.

Citation *Volume 4, Chapter 11, Section 11.1.1.1 (brief reference to study, Page 5); Full study in Appendix J*

Example comment A detailed analysis of the results of the comparison study should be included in the Draft EIS, and not just included as an appendix. The results of the study, and additional concerns expressed by local and federal agency biologists, suggest that the data collected by the Navy consultant during surveys carried out in 2009 are not adequate. In order to address these serious concerns, a new impact analysis is recommended to be conducted using methods supported by the regulatory agencies.

Guam biologists have found several corals, sponges and other organisms in the area that may be dredged that may not have been found anywhere else in Apra Harbor. There are other rare species that may be impacted by the dredging.

Citation *Volume 4, Chapter 11 Section 11.2.5.1 (Page 99)*

Example comment The Draft EIS should not state that there is no evidence to suggest that are species unique to the dredging impact area until the appropriate surveys are conducted. These surveys should be conducted by personnel with the appropriate level of taxonomic expertise. In addition, coral species lists and photographs from surveys carried out as part of the methods comparison study were provided to the Navy consultant by U.S. Fish and Wildlife Service several months prior to the release of the Draft EIS. Several coral species observed within the impact area do not appear to have been recorded elsewhere on Guam, with the possibility of some species not having been reported anywhere in the world. While it is unlikely these species are only in the dredging area, the possibility must be investigated sufficiently by DoD, even if these species do occur elsewhere in the harbor, they may be quite rare and demand special attention.

Coral Reefs, contd.

Artificial reefs are not an appropriate way to replace a natural reef. The Draft EIS proposes replacing the lost natural reef in Apra Harbor with artificial reefs instead of paying for other, more beneficial and effective projects, such as watershed restoration.

Citation *Volume 4, Chapter 11, Section 11.2.2.7 (Page 81)*

Example comment The use of artificial reefs as a way to replace destroyed or damaged natural reefs should be removed from consideration. A more thorough review of a large-scale watershed restoration plan should be provided. Watershed restoration should include projects that will improve water quality, which would improve coral reef conditions. Projects could include reforestation, stream bank stabilization, erosion-control projects, fire prevention and enforcement.

Any action that destroys coral reef habitat must replace what is lost at another location and must compensate for the time it takes for the replacement reef to become "full-grown." The Draft EIS preparers did not use the number or size of coral colonies when making that calculation, therefore lessening the worth of the reef that may be dredged and resulting in a smaller replacement reef. Also, the Draft EIS only considers areas with coral, and does not consider large areas that may not have coral, but which may have sponges, algae, and other important reef organisms.

Citation *Volume 4, Chapter 11, Section 11.2.2.5, (Page 75)*

Example comment Coral colony density and size must be used in the impact analysis and in the model that determines the type and size of the coral reef area that needs to replace the reef destroyed or damaged by dredging. This data was collected by the Navy consultant in 2009, but the methods used were not appropriate and thus the data is not usable. This data must be collected using methods supported by the regulatory agencies, and the results of the new impact analysis must be provided for review prior or the release of the Final EIS.

The combined impacts of the buildup projects, other military projects, and non-military projects will have a larger impact on Guam's reefs than the impacts of any individual project. These combined impacts, including the expected impact of global climate change, on Guam's reefs are not adequately addressed in the Draft EIS.

Citation *Volume 7, Chapter 4, Section 4.3.4 (Page 20)*

Example comment The impacts of all the projects affecting a reef area must be thoroughly examined. In addition, the impacts of climate change on Guam's reefs must be included in the impact analysis. They should also be included in sections of the Draft EIS addressing specific projects to marine resources. Reef recovery data needs reflect other threats to Guam's reefs including climate change.

Much of Guam's reefs will be under increased threats because of the military buildup, especially when considering the impacts of the massive population increase. The increase in people harvesting fish and other animals from the reef and the increase in visitors will put many of Guam's reefs at risk. None of these impacts were addressed by the Draft EIS.

Citation *Volume 7, Chapter 3, Section 3.3.10, (Page 32)*

Example comment The Draft EIS must include a study of the expected impacts to Guam's reefs (on-base and off-base) as a result of the population increase. Such an analysis should examine the impacts of the H-2 workers, the immigrant population from neighboring islands and military personnel on Guam's reef fisheries. The analysis should also examine the impacts of additional recreational use (diving, snorkeling, reef walking, etc.) on Guam's highly-visited reef sites. The Draft EIS should also include a commitment to specific mitigation measures, which may include building local government capacity to carry out monitoring, enforcement, and educational activities; supporting educational activities targeting H-2 workers and immigrants.

Environment and Utilities

The increase of population will increase the amount of wastewater needing treatment. Guam's current wastewater system, as it is, cannot handle the population that is expected to live on Guam in 2014. The Draft EIS does not address how DoD would contribute to GWA to meet Guam Water Quality Standards at the sewage outfalls.

What does the Draft EIS state? The amount of wastewater needing to be processed would peak in 2014 with the combined impacts of the Marine Corps relocation, construction workforce, and civilian growth. This demand will exceed the physical capacity of the Northern Wastewater Treatment Plant. The demand would then decrease and by the year 2019, wastewater treatment demands would be back within the current physical capabilities of the wastewater treatment plant's design.

Volume 6, Chapter 3

Example comment The Draft EIS needs to address how the Department of Defense will contribute to Guam Waterworks so the utility can meet the mandates of the laws in the Guam Quality Water Standards and the discharges at the outfall that are pumped into marine environment.

The Draft EIS claims there will be an insignificant increase in noise pollution from DoD activities to warrant any mitigation. Noise impacts are not addressed for airlift and airdrop operations flight paths, base operations or landing zones.

What does the Draft EIS state? Noise impacts were found to have "less than significant impacts" (LSI) or "no impact."

Volumes 2, 5, 6, and 7

No aviation training would occur at non-DoD lands and therefore no noise impacts would occur. *Volume 2, Chapter 6 , Page 30*

Example comment The Draft EIS must address noise impacts for the aviation airlift and air drop operations flight paths to and from base operations and landing zones at Andersen Air Force Base, Northwest Field , Andersen South, Navy munitions sites, and Orote Fields. The Draft EIS must include discussions and assessments to determine impact, alternatives, and mitigation to residents and endangered species outside the DoD fence line.

The military will rely on GovGuam's landfill to take its trash and construction debris. The draft EIS does not include a study about what will be in the military's waste going to Guam's landfill and it does not address how that increase of waste will be managed. The military's trash is estimated to peak at 23 of the largest solid waste trucks going to Guam's landfill every day.

What does the Draft EIS state? The DoD is proposing to be a customer of GovGuam's permitted landfill facility in Layon.

Volumes 6 and 9

The amount of solid waste created by DoD will more than double between 2011 and 2014. In 2014 there will be 132,970 tons of solid waste sent to Guam's landfill.

Volume 6, Chapter 2, Section 2.4.5 (Page 102)

Example comment Guam EPA requires that a separate Solid Waste Management and Disposal Plan be prepared and submitted. This plan must include a study about what is included in the waste. This study will help address the anticipated waste associated with each activity, its impact to the existing management options, and how such waste streams will be managed.

Guam's water, sewer and power systems will need to be expanded and upgraded to accommodate the population growth from the proposed military buildup. The proposed buildup can in no way threaten the Northern Guam Lens, where we get 70% of our drinking water.

Background GPA and GWA are already planning to upgrade and expand our systems to accommodate our normal growth rate. The proposed buildup adds significant additional growth that has not been planned for previously.

More Information GPA proposes that DoD remain a full customer of GPA instead of building a separate system. Upgrades to GPA's existing systems would be paid for by DoD. In recent talks, DoD has indicated this is a "preferred alternative" for them as well.

GWA proposes integrating the new wells and system into a single system to serve all northern Guam. GWA also proposes DoD must pay for indirect impacts on GWA's system caused by the buildup. The Draft EIS does not address off-base impacts on the GWA water system that arise from the buildup.

GWA proposes using the northern wastewater plant to handle all wastewater from the buildup. DoD would pay to upgrade and expand the plant. GWA would also contribute some funds to this project. In recent talks since the release of the Draft EIS, DoD has indicated that this is a "preferred alternative" for them as well.

What does the Draft EIS state? Dod may build its own separate power system, upgrade existing GPA and DoD systems, reduce energy demand, and utilize renewable energy.

60-70 million gallons a day (MGD) will be needed during the construction phase of the buildup. After the construction phase, 60 MGD will be required to support the new facilities and population growth. These projections leave 20 MGD in Guam's northern aquifer during the construction phase and afterwards.

The Draft EIS proposes drilling 22 new wells on military property. It also looks at options including taking more water from Fena Lake, desalinization and using new surface water sources. The only option in the Draft EIS for providing water for non-military civilian growth is for GWA to drill 16 additional wells on civilian property.

The Draft EIS proposes using GWA's northern wastewater treatment plant to handle the wastewater that comes during the construction and base operating phases. It also proposes the possibility of DoD building its own wastewater treatment plant separate from GWA.

Housing

Guam's current 2,800 surplus of housing units will be utilized in 2010 but it will not be enough to accommodate everyone on Guam in 2011. New housing units will have to continue to be built up to 2014. Once the construction peak has passed and the H-2B workers have returned home, there will be a surplus of 8,500 homes.

The issue In the past, the housing market produced an average 400 to 1,000 units every year. There is a concern that there will be an additional 16,988 in-migrating, off-island workers by 2014 according to the Draft EIS.

What does the Draft EIS state? "It is unlikely that construction of new housing will fully respond to the demand to eliminate a housing deficit." "If sufficient housing is not supplied, this could lead to increased crowding of housing, construction of illegal housing, illegal rentals and homelessness. *Volume 9, Appendices F; page 4-21, Additional Information - Volume 7 Pages 3-59*

The cost to build, purchase or rent housing will increase between now and 2014 a great deal due to the increase of population. This will leave low income families unable to find affordable housing.

The issue The cost to build, purchase, or rent housing units will dramatically increase due to the unmet demand in housing stock. Additionally, competition between contractors to hire and/or retain a workforce as well as a shortage in raw building materials (i.e., aggregate, cement, ect.) will contribute to cost increases. Low-income families will not be able to afford to build, purchase or rent a home.

What does the Draft EIS state? "During the construction period, since large amounts of materials will be used for military base construction, building materials for other projects such as civilian housing will be in short supply. Labor supply is also expected to be an issue. The requirement for construction workers to build civilian housing is an increment above and beyond labor demands. If sufficient housing is not supplied, this could lead to increased crowding of housing, construction of illegal housing, illegal rentals and homelessness.
Volume 9 – Appendices F; page 4-21

Housing prices are expected to decrease dramatically after the construction surge due to the quick reduction in population.

Citation *Volume 7, Chapter 3, Section 3.3.15.2 (Page 54-59)*

What does the Draft EIS state? "If the construction of new housing actually fully responded to the demand, the result would be over-supply of housing following the construction period. This sort of over-supply would drive prices down for residents, but would likely mean substantial losses for developers and landlords."
Volume 9, Appendices F; page 4-17

Human Resources

The number of H2B workers is expected to increase by 16,000 workers for military-related projects not to mention the thousands of workers to complete GovGuam and civilian projects.

Background It is anticipated there will be an increase in on-site labor during the construction phase for military projects. It's expected the labor force will be from Guam and Micronesia first, before expanding the recruitment area. GovGuam will continue workforce training and education programs.

Example Comment The Draft EIS needs to have an analysis of how the proposed action would impact the number of construction and development permits, including workers needed, that would be necessary to complete the planned activities.

It is projected there will be more than 3,700 new federal jobs coming to Guam. 50% of the jobs will be filled by federal civil service workers moving to Guam from Okinawa. 25% are anticipated to be taken by military spouses leaving less than 1,000 jobs for Guam residents.

What does the Draft EIS state? It is projected that there will be 238 civilian military employees in 2010, and 522 in 2011, 2012 and 2013. That number jumps to 3,511 civilian military employees in 2014 and 3,743 every year from 2015 to 2020. It is projected that 50% of these jobs will be taken up by Okinawa transfers while 25% would be absorbed by military spouses (page 4-6) leaving only 25% available for local residents.
Volume 9, Appendix F, page 147, table 4.3-3

Example Comment The Draft EIS needs to have an analysis of how these jobs will affect the off-base job market including wages, availability of skilled employees and the cost of living. There also needs to be a study regarding the possible impact of wage increases or loss of labor to higher paying jobs due to the military buildup.

Historically DoD personnel and their dependents compete for existing jobs off-base as part-time workers, thus decreasing the availability of jobs for local residents.

What does the Draft EIS state? The propsed action would bring many new jobs to Guam but it would also bring a large new population from off-island. *Volume 2, Chapter 16, page 54*

Example Comment There needs to be a complete study regarding how many military dependents will be looking for employment off base and what that will do to the number of available jobs for Guam residents. The Draft EIS needs to incorporate a more sufficient study regarding how the unemployment rate will be impacted by the military buildup.

Environment and Utilities contd.

The increased need for power and would exceed the current Permit Requirements that GPA follows. In order to meet the power demands, GPA would have to apply for a new air pollution control permit from Guam EPA. Federal Exemptions related to diesel fuels should be reevaluated because of the increase usage of heavy diesel equipment.

What does the Draft EIS state? The power demand will exceed current Operating Permit Requirements and that mobile sources are a concern at heavily traveled areas. *Volume 6 and 9*

Example comment The Draft EIS notes GPA will exceed it's current permit, but the Draft EIS shifts the burden to the local utility to solve the issue. The Draft EIS doesn't address the total pollutants during peak traffic hours and peaking generators being utilized at the same time in highly populated areas. The Draft EIS needs to include alternative operating scenarios with GPA in reducing the operations of peaking generators located in densely populated areas.

Cultural and Ocean Resources

Recreation and historic resources, for example, Mount Lamlam, that are currently accessible to both civilian and military personnel will be restricted so that only Department of Defense personnel will have access to them.

What does the Draft EIS state? The change in land ownership may result in a change in public access policies that may result in an adverse land ownership impact.

Volume 4, Chapter 8,Section 8.2.1.1, Page 2

The buildup plan currently includes a firing range Pagat, Mangilao. This plan will result in fencing around the site and only allowing access 104 days a year.

What does the Draft EIS state? Long-term changes would include the direct loss and disturbance of archeological sites and historic buildings on Guam from the construction, demolition and long-term restriction from potential traditional cultural properties as a result of training and safety requirements relating to firing ranges. *Volume 8, Chapter 5, Section 5.10.2, Page 6*

The Draft EIS does not utilize information about sea turtles on Guam relevant to Apra Harbor. There is sea turtle data which would provide more accurate estimates of sea turtles and require the military to do more mitigation for these endangered animals.

What does the Draft EIS state? Green and hawksbill turtles are known to utilize Apra Harbor, but there are only historic records documenting use of beaches for nesting near the project area. The Navy recognizes that there are many on-going and recent past studies on the subject of potential exposures to sea turtles and other marine species from pile driving actions. Further research and validation of these studies are necessary before to being able to determine how useful the studies would be to the proposed action in this Draft EIS. *Volume 4, Chapter 4, Page 34*

Example comment The DoD needs to use more comprehensive data about sea turtles in the Draft EIS.

Economy and Social Services

There will be a recession-like period after 2014 where businesses would have to end or cut back. Many workers would have to out-migrate due to job loss.

What does the Draft EIS state? The island of Guam should expect a significant increase in off-island construction workers to meet the construction needs of the proposed action. Guam may experience a "boomtown" effect, when a community experiences a period of extraordinary growth and expects a rapid decline as the project is phased out. The proposed action would support a combined 43,278 workers at the 2014 peak, but only 6,930 after construction ends in 2016. This suggests a sudden recession-like period. Some businesses would have to end or cut back, and many workers would have to out-migrate due to job loss. *Volume 9, Appendix K, Page 147*

The increase in population is expected to increase the services required at Guam Memorial Hospital, the Department of Public Health and Social Services, the Department of Mental Health and Substance Abuse and the Guam Police Department. There is no plan in the Draft EIS on how to help these agencies handle the increase in necessary services. Many of these agencies are at capacity.

What does the Draft EIS state? There will be 54,649 more patients needing services at GMH and almost 30,000 more clients at Public Health and Social Services and Mental Health and Substance Abuse. *Volume 9, Appendix K, Page 61*

Making effective comments

Personal statement/comment form

This form must be sent in by Feb. 17, 2010 to JGPO or by Feb. 16, to your mayor's office.

Volume	Page Number	COMMENT AREA	RECOMMENDATION AREA
		- Be specific. **Specific comments** help change things! - If the segment of the Draft EIS you are reading does not make sense, state that in your comment. - If the Draft EIS section does not seem to have enough data or information, make sure to note that in your comment.	(State your specific request, demand or idea) - Make sure to write the who, what, where, why and how of what you want - Write the specific action you want including, times, dates, places, frequency, duration, laws to be followed, responsible partners, who will benefit/be affected, and boundaries.
Volume 4	Chapter 11 Section 11.2.2.2 Page 45	The proposed dredging project in Apra Harbor does not include a complete study of how the coral reefs in the area will be impacted. The plan doesn't mention what the dredging will do to the 25 acres of reef found right next to where dredging will occur. These corals may be deeper than 60 feet, but these reef areas are very vulnerable to the impacts from dredging. Also, there's an additional 70 acres of reef that may be impacted by the dredging but which are not included in plan.	DoD must include deeper reef areas (deeper than 60 feet) in the impact analysis. Data is not currently available for these areas, so additional coral reef surveys must be carried out. The results of the complete impact analysis should be provided prior to the release of the Final EIS.

Drop this form at the following GovGuam locations; Governor's Office - Adelup on the 1st level, mayor's office, 3rd floor of the GCIC building - Guam Coastal Management Progam.

MAN • LAND • SEA
News of Guam and her Ocean Environment
Volume 2 • Issue 2

n this issue

he build-up's effect
n nature. Page 3

Task at hand

11 subcommittees research to prepare for buildup

When the military buildup was announced on Guam, Gov. Felix Camacho felt it necessary to create a task force made up people from the military, the private sector and the Government of Guam.

"The governor wanted to make sure Guam was prepared for the buildup and what the socio-economic impact would be to the local community," said Civilian Military Task Force Chairman, Tony Lamorena. "Whenever you have a major move like this obviously there are going to be impacts. A lot of people just look at the economic side of it but there's schools, hospitals, medical care, public safety and those kinds of issues."

Today, about two years after its inception, the Civilian Military Task Force is investigating those areas and forming plans on how to deal with the problems that are arising.

"We're doing very well," Lamorena said. "There are eleven subcommittees. You have economic development, health, public safety, customs, infrastructure, environment. Each one of them are faced with addressing issues and concerns that they're going to encounter as a result of the buildup."

WHO TO CALL

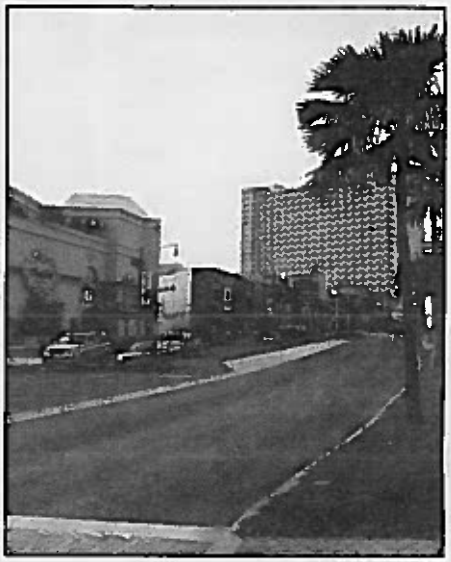
■ Bureau of Statistics and Plans: 472-4201

The chairman said one of the important issues is education.

"For example- schools. How many more schools are we going to need ? Where are we going to build these schools? Where do we anticipate the population shift to be," Lamorena said. "Not only that but we work with the University of Guam to make sure their teacher program is fueled so they can train enough teachers to fill those schools. It's like a domino thing."

Lamorena said many of the subcommittees have already drafted plans.

"Each subcommittee has done an evaluation of the impacts and are now working on solutions," Lamorena said. "The intent of the subcommittees is not only to evaluate but also to be solution oriented. They come up with plans on how best to address the impacts the military buildup is going to have."

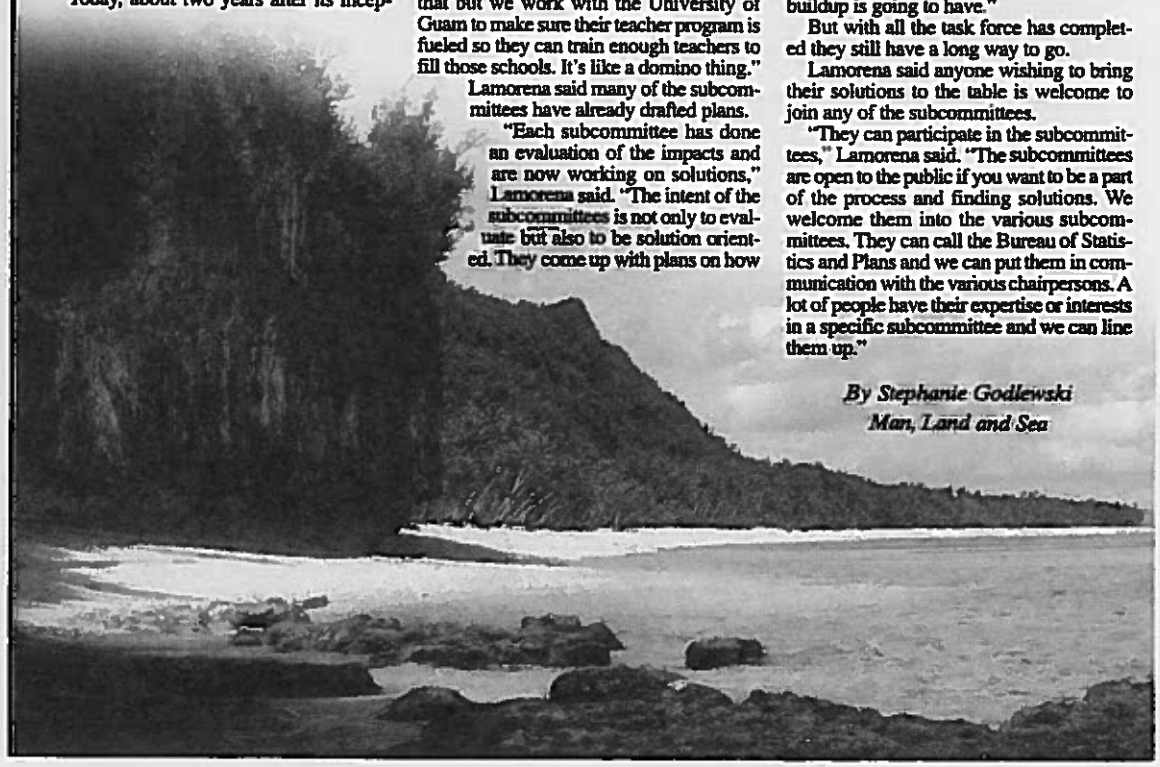


But with all the task force has completed they still have a long way to go.

Lamorena said anyone wishing to bring their solutions to the table is welcome to join any of the subcommittees.

"They can participate in the subcommittees," Lamorena said. "The subcommittees are open to the public if you want to be a part of the process and finding solutions. We welcome them into the various subcommittees. They can call the Bureau of Statistics and Plans and we can put them in communication with the various chairpersons. A lot of people have their expertise or interests in a specific subcommittee and we can line them up."

By Stephanie Godlewski
Man, Land and Sea



Message *from the* Director

Hafa Adai,

With the impending military buildup set to begin in 2010, numerous dedicated and hard working individuals and organizations in the private, public, non profit organizations have been meeting for the past 18 months to ensure that the build up addresses your concerns and issues. The Chairpersons and the members of the eleven subcommittees of the Civilian Military Taskforce (CMTF) was established by Governor Felix P. Camacho through Executive Order 2006-10 creating the taskforce, since then the 11 subcommittees have begun the ardious task of preparing Guam for the largest single military buildup in military history.

The ultimate goal of the taskforce is to identify issues and concerns of the local community as a result of the military buildup and to find resolutions through the implementation of a integrated master plan. These hard working committee members have been diligently addressing the demands that will burden Guam's present infrastructure in the future. Granted we understand the economic benefits associated with the buildup which will bring increased business and employment oppurtunities to the people of Guam. But, we must also have to look at the Socio/Economic impacts that the Guam buildup will bring on our power, water, roads, hospital,health services, education to mention just a few. This issue of "Man, Land and Sea" hopes to address some of your concerns and that we are able to answer some of your questions. Much of the military plans are still in the draft stages which has made it difficult at times for the taskforce in formulating long range plans.

Governor Camacho in the establishment of the taskforce has stated that he wanted the community of Guam to participate in the process, if you are interested in being a part of the taskforce we welcome your participation in any one of the eleven subcommittees, please call me at 472-4201.

Si Yu'os Ma'ase,

Tony Lamorena

Public notices for Federal Consistency Reviews

Section 306(d)(14) of the Coastal Zone Management Act of 1972, as amended, requires public participation in the federal consistency review of proposed project with the Guam Coastal Management Program (GCMP) enforceable policies. Project proponents have filed a statement of determination and accompanying information with the GCMP/BSP Office certifying that their proposal is consistent with these policies. This information is available for public inspection at the GCMP Office, Suite 303, GCIC Building. Written comments may be submitted to GCMP Office within 21 days of this publication date or as otherwise noted below. To submit comments electronically, send an e-mail to afdeleon@mail.gov.gu.

Anyone having questions regarding the public comment process, or having comments on project listed below should contact:

Amelia F. De Leon, Planner
Guam Coastal Management Program
Bureau of Statistics and Plans
P.O. Box 3631
Hagatna, Guam 96932
Tel.: (671)475-9669 Fax: (671)475-4

Bile Bridge and Pigua Bridge Reconstruction and Widening Project

Nos. GU-NH-NBIS(0004) & GU_NH_NBIS(003), Merizo

Federal Consistency application submitted by DPW for the construction of permanent bridges to replace the existing Bile and Pigua bridges located along Route 4, in Merizo. The Conceptual Design Plan is designed to improve the long-term stability of the roadway against future typhoon event, sufficient capacity to pass the 1-percent (100 year) flood. The project is 100% funded by the Federal Highway Administration.

New Fiber-Optic Cable Landings at Taleyfac Bay, Agat, Guam

An application was submitted by Duenas, Bordallo, Camacho and Associates Inc. on behalf of TKC Technology Solutions LLC, for the proposed cable landing of a new fiber-optic cable on the Taleyfac reef flat in Agat. The project is to land fiber-optic cable through an existing empty conduit in Taleyfac Bay. This cable will connect Guam with a military station in Kwajalein Atoll, Marshall Islands and will be done in two phases.

MAN, LAND & S NEWSLETTER
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EDITORS
Tom Quinata
Esther G. Taitague

BUREAU STATIST & PLANS
Alberto A. Lamorena
Director

GUAM COASTA MANAGEMENT PROGRAM
Evangeline D. Lujo
Administrator

GCMP STAFF
Raymond Caseres
Amelia De Leon
Terry M. Perez
Esther G. Taitague
Victor Torres
Timothy Semuda
Nydia Llarenas
Dave Burdick
Tom Quinata
Romina King

NOAA CORAL RE MANAGEMENT FELLOW
Elaina Todd

FOR GCMP INFORMATION
Please contact:
Evangeline Lujan
Man, Land & Sea Newsletter
Guam Coastal Management Progra
Bureau of Statistics & P
P.O. Box 2950
Hagåtña, Guam 969

TEL:
671.472.4201/2/

FAX:
671.472.1812

E-MAIL:
vanos@mail.gov.gu

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Photo courtesy of Dave Burdick and Mitch Warner

Protecting Guam's *natural resources*

Guam is facing a huge influx in population with the impending military buildup, which has some worried about how our natural resources will survive such a large strain.

Evangeline Lujan, administrator for the Guam Coastal Management Program, sits on the natural resources subcommittee of the Guilian Military Task Force.

"A huge concern for the subcommittee is the effect the buildup may have on Guam's coral reefs.

"The impact of development on coral reefs is another we're concerned about," Lujan said. "Our coral reefs are going to be hugely impacted because they will need to dredge some of that reef to accommodate some of the development they are proposing."

The buildup will also have an impact on other types of Guam wildlife, including the island's only bat population which is housed on military property. If the bats' habitat is developed they won't be the only population without a home.

"They are also developing on Guam's only remaining native forest," Lujan said. "So for some of the habitat required for the ko'ko' bird and all the native birds that require specific types of habitat within our native forest that's a big problem."

But it's not only wildlife that could be impacted by the influx of population.

Every time a Guam resident turns on their water tap, they could feel the effects.

"The increase in population will be occurring in the north of Guam, partly above the northern aquifer," Lujan said. "The northern aquifer provides 80 percent of Guam's water. All the development there, even the regular private development, has to be highly monitored because of the potential impact to water quality."

These effects are just a few of the issues Guam's natural resources is facing with the impending military buildup.

But Lujan said the subcommittee is working diligently to combat them.

"We've finalized our strategy to address the impact on natural resources," Lujan said. "We are also working on a mitigation plan that will address what to do to mitigate certain types of development that will be occurring as a result of the buildup, both private development as well as development on the Department of Defense property."

But plans and strategies aren't the only thing that the subcommittee is putting together. Lujan said they're also trying to adjust existing regulations.

"We are trying to change some of the building codes update our capacity within the local agencies to continue to monitor some of the local development."

Though they've been able to get a jump on the future, Lujan said it hasn't been without its difficulties.

"It's been a struggle I'd say. Locally we're cooperating," Lujan said. "We have a problem of getting updated information. That seems to be the problem all of us are having-what is really happening, the quickness of getting the information."

But it's not only getting information that's difficult, it's how to deal with that information once they have it.

"For the government, one of the hurdles we have is the lack of capacity and staff to address all the issues that are required," Lujan said. "When you see our strategy, we have a huge strategy, but how we are going to achieve that with the level of funding and the level of staffing is going to be a challenge."

The subcommittee member said there is no money allotted to natural resource agencies from the Government of Guam's general fund, it all comes from grants.

The subcommittee is facing a huge task with little to work with, but anyone can help.

"We're going to be doing some public outreach in terms of a land use plan," Lujan said. "Not just to deal with the development but to give direction to where we want to see development."

Lujan said she hopes some Guam residents will be willing to speak out on behalf of the resource.

I think the public has to stand up and say these resources are critical and some of this development needs to be scaled down," Lujan said. "Right now we're embracing a lot of development because we say they're giving us jobs or economics, but really they say this without providing data. I want to see the data because if we're going to sacrifice our natural resources and our environment we need to be doing it with some numbers."

Lujan said those wishing to take part in the natural resources issues can contact the Bureau of Statistics and Plans to find out how.

By Stephanie Godlewski
Man, Land and Sea

14th annual Guam International Coastal Cleanup

(ICC) September 20, 2008

- 31,111 pounds of garbage were collected in less than 4 hours.
- Over 3,200 volunteers cleaned 17 shorelines and 3 dive spots
- Volunteers were treated to free admission at the UnderWater World and Fisheye Marine Park for the day.
- The top three most collected items by volunteers on Guam were:
  1. Cigarette butts- 17,274
  2. Beverage cans- 16,774
  3. Glass bottles- 9,664

Special Thanks from the Bureau of Statistics and Plans, Guam Coastal Management Program to the sponsors and groups who contributed in many ways:

Guam Visitors Bureau, UnderWater World, Guam Chamber of Commerce, Micronesian Divers Association, National Park Service, Ambros, Inc., Guam Tropical Dive Station, Lagu Sanitation Trash Co. (Morrico Equipment), Guahan Waste (Mr. Rubbishman), Pacific Waste (Commercial Sanitation), Sunny Wholesale, Guam Community College, Foremost Crystal Clear, Coca Cola Beverage Company (Guam) Inc, Guam Cell Communications, Fisheye Marine Park, Tri-Vision Media, Sam Choy's, Pacific Daily News, Copy Express, GWHS Marine Mania, UOG Marine Laboratory, Pyramid Recycling, I'Recycle, Balli Steel Guam; Tamuning, Dededo, Agat, Umatac, Merizo, Inarajan, and Yona, Asan, Mangilao, Ordot/Chalan Pago and Piti Mayors; U.S. Coast Guard Auxiliary, U.S. Navy, Andersen Air Force Base, Government of Guam Agencies (Dept. of Parks & Recreation, Department of Agriculture, Guam Environmental Protection Agency, Dept. of Public Works and Office of the Governor).

Photos by Cil Olandez

"We need it now. We cannot wait two or three years from now or it'll be too late."
- John Benavente,
general manager of the Consolidated Utilities Service.

Changes to infrastructure needed soon to support buildup

Time is running out for Guam to make some early moves in infrastructure to make sure that the upcoming military buildup goes smoothly, says John Benavente, general manager of the Consolidated Utilities Service.

Unlike other affected areas of Guam that are seeking money to develop a master plan to handle the buildup, Guam's power and water systems are ready to build.

"Normally, we wouldn't have to do it for the next 20 years, but we're trying to do it in five years, just to accommodate the population needs, not counting upgrades," he says. "We need it now. We cannot wait two or three years from now or it'll be too late."

Benavente says that after two years of research and study, it's time for action. At the top of the list for Guam's water system are more than a dozen wells that are needed, plus a comprehensive upgrade to the wastewater facility in East Hagåtña.

While Guam's generation capacity does have enough extra to handle the needs over the next couple of years, an accelerated plan includes a new power plant -- one that will take between five and seven years to build, he says.

"In almost every area, we've identified what needs to be addressed to handle the population growth of the military and impact on the civilian community," he says. "We need help now, we need the money to prepare for it."

Initial estimates show that Guam's water system needs about $192 million and Guam's power system, about $460 million. But they don't need all of it now – they need just enough to get started – about $24 million for power and $31 million for water.

"At least get us going with a 1-year funding. At least some seed money. We need to fund the critical infrastructure needs that need to be ready. We can put up lines pretty quick but things like drilling wells, putting substations in place, that takes years," says Benavente. "We have to put these things in the ground before the military digs its first spade. Guam is already starting to grow, there's lots of speculative investments being made."

Benavente made it clear once again that his office will not approve any development that adds to the current system unless they can be assured that the system will not degrade services to existing customers.

"We are serious about not having wastewater in the streets. We are serious about not degrading the quality of water and power service to the customers today," he says. "That will mean we have to make the tough decisions until this is done."

Building up Guam's systems also has a good net effect on Guam's population. Better infrastructure means additional reliability, better capability, faster recovery.

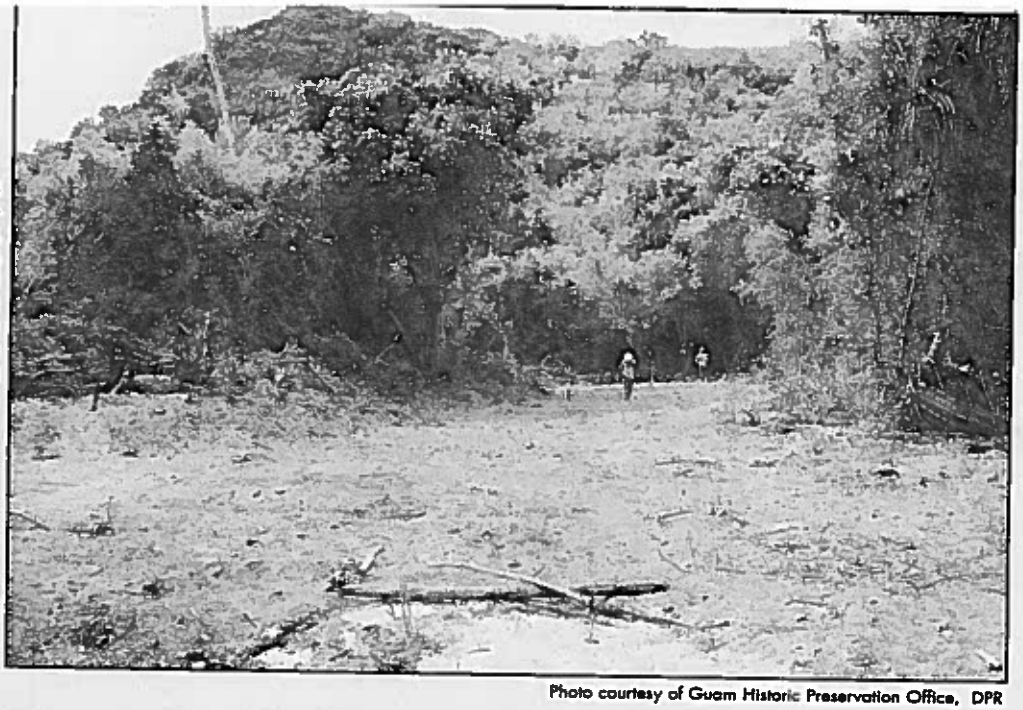
The growth is coming, he says, and at worst, there will be a delay in the buildup. Benavente says that the military is getting close to a decision on whether they will be a customer of local facilities or build their own facilities.

"Of course what we would like to see is an integrated system for the whole island, because that benefits the military and the community outside the fence," he says. "We are trying to get the military as our customers."

Benavente says anyone who has any influence on decision makers should use that influence to get things started. He has high hopes that things will get done.

"We'll continue to get the message across and if we don't get it in time, it just means that we'll do as best as we can to adjust," he says. "But it's important to get the momentum going. We're at the point where we've made so many presentations, we've looked at all the scenarios, we know what needs to be done. We're happy with the people behind Guam's infrastructure; they're seasoned pros. Given the funding, things will get done."

By Jojo Santo Tomas
For Man, Land & Sea



Left: This archaeological site in Tumon was cleared without the proper permits. The Historic Preservation Office under the Department of Parks and Recreation issued a Notice of Violation to the company that cleared the area.

Photo courtesy of Guam Historic Preservation Office, DPR

Social impact *of the* military

Public services may face changes

While the utility, construction and real estate industries will be among the first to feel the impact of the impending military buildup, residents can expect to see big changes in every aspect of island life.

Public Health services will need to expand to handle the projected growth of as many as 40,000 new people, including thousands of temporary workers who will do the actual construction.

One of the key areas that we're gonna look at is the access to health care, the need for enough doctors, nurses, social workers, etc., to be available to meet such an increase," says J. Peter Roberto, acting director of the Department of Public Health and Social Services. "The other area that is of great concern is the issue of drug and alcohol abuse, we need to build more and expand our programs there."

Roberto is the chairman of one of 11 subcommittees of the Civilian Military Task Force, created two years ago to research Guam's concerns and needs in anticipation of the buildup.

"Right now our mission is to come up with a plan for health and social services impact. The overall goal is an integrated master plan," he says. "We've completed a very initial needs assessment and now, we're at the point of obtaining some seed money so we're able to bring on some consultants to assist us in writing our five-year plan."

Photo courtesy of Dave Burdick

Ancestral: Special care needs to be taken to protect artifacts such as this large grinding stone called a lusong as development on Guam continues in anticipation of the military build up.

The plan will cover a variety of scenarios and make recommendations for widespread expansion and growth to increase capacity.

Many improvements are obvious. On the public health side, communicable disease and environmental health programs need a big boost to handle the needs of a looming immigrant workforce. These include dealing with possible problems such as sexually transmitted diseases and AIDS, to preventable ones such as measles and tuberculosis.

"We have to make sure that those coming to Guam specifically for the military buildup have their shot records. This is our opportunity to prevent things at the forefront," says Roberto. "And we have to make sure that those records come from a certified health clinic. We don't care where you come from, we just want an updated record so we can give a true account to the people of Guam, to stop the spread of these very communicable and preventable diseases."

He adds that his committee may ask the contractors to assist Guam's overall health situation by covering some of the health-care costs.

Other government functions are affected too, including mental health, disabilities advocacy, public assistance programs such as food stamps and WIC, and even the Department of Corrections. Social service programs such as the Catholic Social Services, Sanctuary and others will also see an increase in clients.

"Of course we don't want to see more DOC expansion or things like that. But to be responsible, we need to recognize the trend for these types of services so we can maintain public safety issues. We need to accept the reality that these issues are in our community, so let's be responsible and prepare for it," says Roberto. "The worst thing is that we don't prepare, it arrives, then we have serious social welfare and even public health issues."

Education

The University of Guam is also trying t stay a step ahead of the buildup with prop er planning, says David Okada, acting direc tor of Institutional Effectiveness, Planning and Research at UOG.

Okada also chairs the subcommittee or Education for the task force. Its member include representatives from the Guam Community College, public, private and Defense schools, the library association, KGTF and two senators.

"What this military buildup does is accelerate the number of potential job opportunities, sooner rather than later. Jobs such as environmentalists, we already know that there's a need for them now," he says. "There's teachers, nurses, accountants, program managers, just to name a few. There's also the need for construction workers. Carpenters, electricians, engineers ... it's not just UOG."

Okada says UOG has two roles for the buildup: First, ensuring that degree or certification programs remain relevant to what the community and military buildup will need; and secondly, to provide technical expertise as needed.

"When it comes to supporting the community, we play a support role. What we do what to be at some poing is the natural choice for a repository of information, to support all agencies on Guam," he says.

UOG can already provide support in many areas including marine impact, water capacity, biology, business, administration and economic support, research and historical preservation.

Preservation

Patrick Lujan, the Deputy State Historic Preservation Officer with the Department of Parks and Recreation, says his office is already dealing with the construction issues brought on by speculation.

"Whenever there's buildup, we're involved. From hotels to subdivisions to landscape changes, we've been involved and it continues to this day," he says. "We have to be on the lookout that procedures are followed through and laws are abided. Those are the biggest challenges."

Lujan says he is paying special attention to coastal construction.

"Those are where most of our cultural resources are. Latte sites, Spanish buildings ... in subsurface testings, we've found a lot of cultural artifacts that tell a story on who we were, how we lived. That's important information that our ancestors can tell us," he says.

Lujan says that while it is his job to make sure that any unearthed artifacts are respected and handled properly, the onus to report those artifacts is on the people who find them.

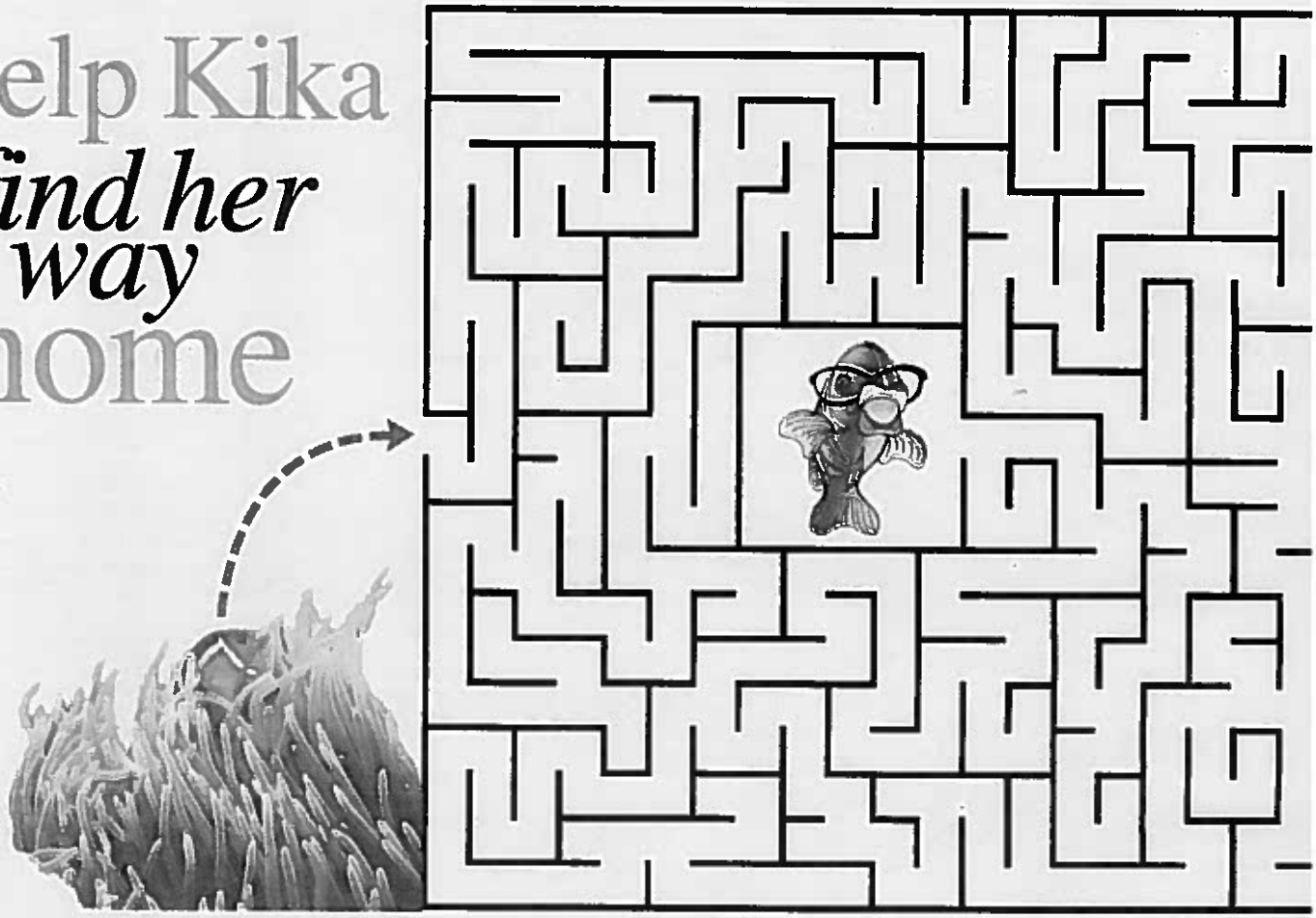
"Time is money. Whenever any cultural resources are found, it puts a stop to a project for an undetermined amount of time. Some may turn a blind eye and a lot do," says Lujan. "We're not out to stop any project, that's not our job. But let's respect our past and do the right thing of reporting it to the proper authorities."

Lujan says that a quick phone call to the Historic Preservation Office at 475-6294/5 is all a contractor would need to verify if suspected artifacts are indeed such.

"Even if they just think it is, our guys can come out and check. It shows that they want to preserve our history," says Lujan. "Whether you're from Guam or not, we should all respect what history can tell us."

By Jojo Santo Tomas
For Man, Land and Sea

Help Kika *find her way* home



Kika's Word Search

Find the following hidden words:

military
housing
schools
coral
beaches
marines
traffic
hospital
parks
family
aquifer
protect

S	M	M	H	Z	E	P	I	L	E	P	I
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MAN • LAND • SEA
News of Guam and her Ocean Environment
Volume 1 • Issue 5

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Quick coral facts on Page 6

Acting Governor Declares 2008 as Year of the Reef

Events Focus on Coral Reef Education and Protection

Acting Governor Michael W. Cruz signed a proclamation declaring 2008 as Guam's Year of the Reef during a press conference held on February 01, 2008, marking the official launch of Guam's International Year of the Reef Campaign, developed by the Guam Coastal Management Program in conjunction with National Oceanic Atmospheric Administration's (NOAA) Pacific Islands Regional Office (PIRO) and encourage all to participate.

"Guam's coral reef ecosystems are an extremely important part of our culture, economy, and environment. This unique and fragile system must be protected for current and future generations," says Evangeline Lujan, Administrator for the Guam Coastal Management Program and Guam's point of contact for the U. S. Coral Reef Task Force (USCRTF). "It is admirable that our current administration recognizes the value of Guam's reefs and is supportive of our efforts." Events scheduled for Guam's IYOR campaign will focus on celebrating reefs and protecting reefs. Guam has over 300 hard coral species! This is more than 5 times the number of coral species that occur in the entire Caribbean. According to *The State of Coral Reef Ecosystems of Guam Report*, the health of Guam's coral reefs has declined in the past 40 years. Guam's reefs face many threats including coral bleaching, climate change, diseases, tropical storms and land-based sources of pollution. "These events will be a fantastic opportunity for our community to learn about our unique coral reef ecosystems and the natural and anthropogenic threats they face. We are excited to help the community become active stewards of our precious resource," says Evangeline Lujan. "One particular program I am extremely excited about is Guardians of the Reef."

Reef guardians

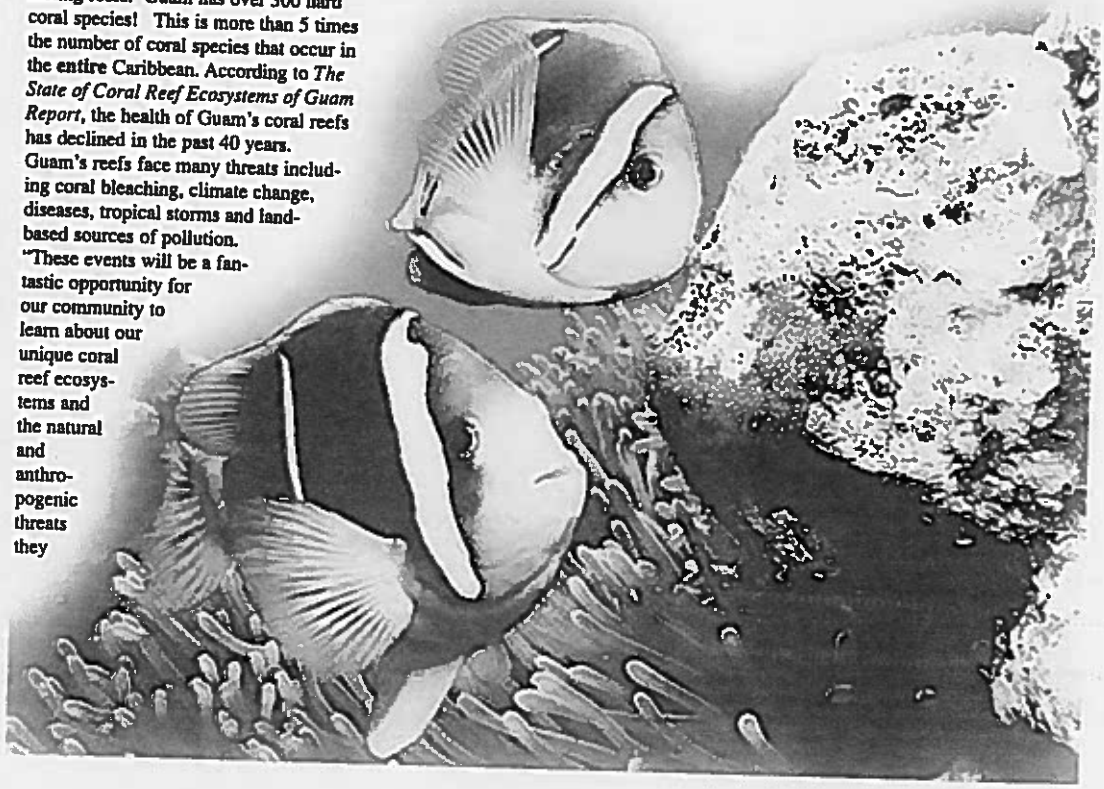
Guardians of the Reef is an innovative environmental education program specifically developed for third-graders focusing on the importance of coral reefs, threats, and what can be done to protect them.

PSAs on YouTube

Also, the Guam Coastal Management Program and NOAA PIRO recently sponsored a user-generated public service announcement (PSAs). About 30 creative entries were submitted and have been uploaded to YouTube. The general public will vote for their favorite PSAs. Winning PSAs will air during 2008. For updated information about the PSA contest, please visit http://www.guamiyor08.com/contest.html.

"Guam is extremely pleased to join this International campaign and looks forward to the many events scheduled for this year. We could not have done this without our local and federal partner agencies. I am extremely thankful to be working with such a dedicated group of individuals." says Evangeline Lujan. For more information regarding the Guam's International Year of the Reef, please visit http://www.guamiyor08.com. For a copy of Guam's International Year of the Reef 2008 Strategy, please visit www.iyor.org/focalpoints/countries/guam/Guam_IYOR_Action_Plan.pdf.

For any questions regarding Guam IYOR08 activities, please contact Romina King at 671.475.9666 or via email at rominaking@gmail.com



Acting Governor Declares 2008 as Year of the Reef

Seated from left: Romina King, Evangeline Lujan, Acting Governor Michael W. Cruz, Alberto "Tony" Lamorena, Trina Leberer, and Tom Quinata. Second row: Terri Perez, Esther G. Taitague, Susanne Wilkins, Victor Torres, Adrienne Loerzel, Jackie Perry, Tammy Anderson, Amelia De Leon, Dave Burdick, Tim Semuda, and Margaret Aguilar. Last row: Ray Caseres and Val Porter.

Message from the Director

Hafa Adai!

This year has been designated the International Year of the Reef (IYOR) as a worldwide campaign raising awareness of the importance of coral reefs and engaging the community to actively participate in protecting them.

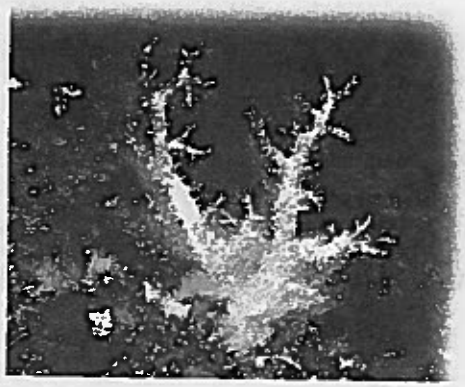
Coral reefs are among the most diverse ecosystems in the world and have been best described as the "rainforest of the oceans". Coral reefs provide a safe haven for a variety of sea creatures that depend on corals for food and shelter

This issue of Man, Land and Sea depicts the importance of this critical habitat and the threats of coral reefs. Guam has many different types of reefs surrounding the island such as fringing reefs, patch reefs, submerged reefs and barrier reefs. These reefs are an extremely important part of our culture, economy and environment. This ecosystem is very fragile and must be protected from many threats including coral bleaching, climate change, diseases, tropical storms and land-based sources of pollution.

There are several events scheduled for Guam's IYOR campaign to focus on celebrating reefs and protecting reefs at http://www.guamiyor08.com. These events will be a fantastic opportunity for our community to learn about our unique coral reef ecosystems and to engage in becoming active stewards of our precious marine resource.

Sincerely,

ALBERTO "TONY" A. LAMORENA, V
Bureau of Statistics and Plans



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Editor
Esther G. Taitague

Bureau Statistics & Plans
Alberto A. Lamorena V
Director

Guam Coastal Management Program
Evangeline D. Lujan
Administrator

GCMP Staff
Raymond Caseres
Amelia De Leon
Terry M. Perez
Esther G. Taitague
Victor Torres
Timothy Semuda
Nydia Llarenas
Dave Burdick
Tom Quinata
Dionne Shinohara
Romina King

For GCMP information Please contact:
Evangeline Lujan
Man, Land & Sea Newsletter
Guam Coastal Management Program
Bureau of Statistics & Plans
P.O. Box 2950
Hagåtña, Guam 96932

Tel:
671.472.4201/2/3

Fax:
671.475.4512

E-mail:
vange@mail.gov.gu

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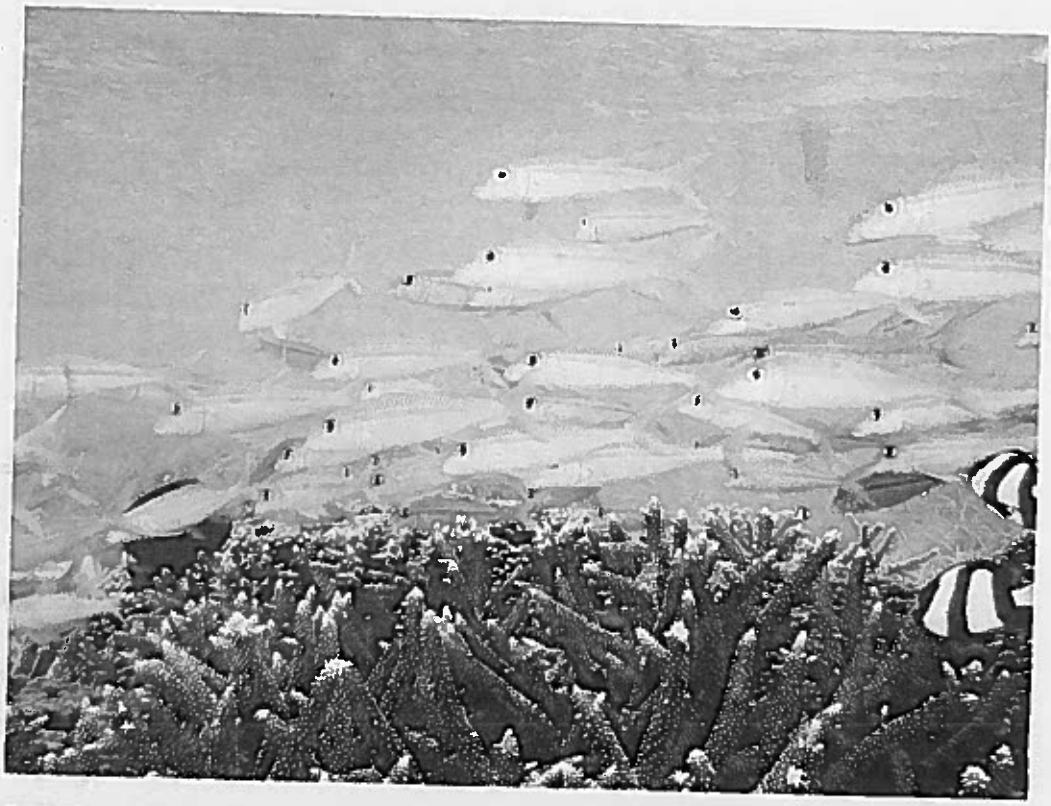
International Year of the Reef 2008

By Charmaine Chan
For Man, Land, and Sea

This year has been officially designated the International Year of the Reef (IYOR). This means that 2008 will see greater efforts to highlight the importance of coral reefs, educate the public about current threats to their survival and sound a loud call to action for protection.

The last designated IYOR was 1997 and that was deemed a success, with 225 organizations in 50 countries participating, lots of media coverage, hundreds of scientific surveys undertaken and consequent conservation efforts initiated.

However, with environmental degradation hastening apace and global warming becoming the topical issue on everyone's lips these days, the threat to coral reefs and the consequent need to protect them has become ever more urgent. Amidst melting polar icecaps, dwindling rainforests and increasing numbers of species hovering on the edge of extinction, the world needs another reminder that coral reefs should be one of the main battlefields upon which we stage the crucial fight to save our embattled planet.



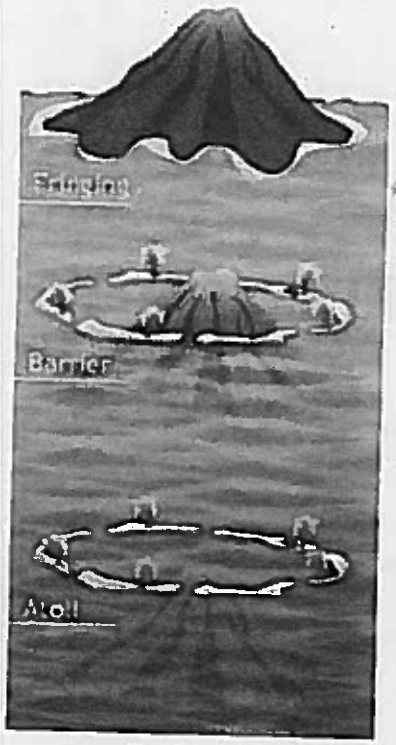
Reefs – what they are and their importance

So what exactly are coral reefs? Well, corals are actually animals which live in the sea. They exist as individual polyps but tend to group together into a colony of hundreds or thousands. Coral reefs are the result of hard corals extracting calcium from the seawater and using it to construct a hardened structure around them. This structure — the reef — functions as their home, providing protection for them as they grow. Because they are the result of a living organism, coral reefs can grow until they reach epic sizes – think of the Australian Great Barrier Reef. They are the largest living structure on earth and the only one visible from space.

Coral reefs are important because they're home not just to coral polyps, but also to millions of other marine species as well, like fish, invertebrates and other sea mammals. They act as a haven and refuge for all of them, providing food, safety and areas for spawning and rearing their young. Each reef boasts extraordinary biodiversity — covering less than one percent of the ocean floor, reefs support an estimated 25 percent of all marine life, with over 4000 species of fish alone. In short, they are the marine equivalent of rainforests.

Moreover, reefs also save us from the worst of destructive forces of nature like typhoons, cyclones and hurricanes, protecting us from the full force of such storms by acting as natural breakwaters and cushioning the land by minimizing wave impacts.

To humans and our economy, reefs generate billions of dollars of revenue and provide millions of jobs, simply because their beauty and diversity fuels the mega industries of recreation and tourism. People travel and pay money to see coral reefs, to enjoy and experience the stunning colors of coral reefs and the many fascinating species that inhabit them. Snorkelers strap on flippers and dive masks; while divers hoist on their dive tanks and many others get into glass-bottomed boats or submarines just to be able to observe the diverse marine life that teems around a reef.



Darwin's three stages of atoll formation (source: NOAA)

Reefs – current threats

The fact that a coral reef is the very foundation of a marine community and that it supports so many species means that it needs to maintain balance at all times. This state of balance is a fragile one, and a change in any one factor can have a huge impact on a reef.

But today, with the pressures of human activity and development leading to widespread environmental degradation, coral reefs are struggling with not just one environmental stress factor, but many. In short, they are being attacked on all fronts. This combined with their vulnerability to environmental stress has meant massive devastation for reefs around the world. A study has shown that about 10% of reefs are already dead while 80% of the reefs in Southeast Asia (which constitute a significant part of the world's reefs) are considered endangered.

Some of the factors that have had particularly disastrous consequences have been due to fishing. Destructive fishing practices like dynamite and cyanide fishing break up coral reefs and kill other species as well, species that are not even sought by fishermen, resulting in terrible waste. Over fishing of reef species also upsets the fragile ecosystem — often a result of the Global Aquarium Trade, where demand by aquarium owners has led to over harvesting of marine organisms.

Other big factors include coastal development projects. These often involve dredging, clearing land, land reclamation and destruction of mangrove swamps leading to buildup of sediments and dumping of waste material, all of which choke and smother corals to death. Pollution is another obvious factor, where oil, sewage, litter and storm runoff contribute to degrade the quality of water, and corals die as a result.

Last but not least, global warming has meant that oceans have become more acidic as they tend to absorb the excess carbon dioxide from the atmosphere. This has also been accompanied by a rise in ocean temperatures. These two factors have resulted in coral bleaching, a sign of severe stress in corals and often a precursor to death, if normal levels are not restored.

Guam's coral reefs

As a Pacific island dependent on tourism, reefs are of particular importance to Guam. Our island has over 100 square km of reefs in near-shore waters and an additional 110 square km within the EEZ. These reefs are home to over 1000 species of shore fish, as well as over 5100 species of marine organisms.

The perfect beach weather, clear turquoise waters and reputation as an unparalleled dive spot bring in millions of tourists to Guam each year. It has been estimated that Guam's reefs are worth $127 million per year to the economy through industries like tourism, recreation, fisheries, research/education, amenity and coastal protection.

Yet it is undeniable that like reefs all over the world, Guam's reefs are under attack. Valerie Brown, Coral Reef Ecologist, thinks that the main challenge to Guam's reefs will be population pressure. "Our population keeps increasing and putting more and more pressure on our reef resources, at the same time climate change and ocean acidification are also starting to impact our reefs," she says. "With the buildup associated

continued on page 6

Photos by Dave Burdick

from page 3

with the marine relocation, our population may grow by over 30%, so it is going to be a serious challenge to maintain the health of our vital coral reef ecosystems."

So what can we on Guam do about one of our most precious resources? Reef protection may sound a little abstract and distant, a realm for marine biologists and dive enthusiasts perhaps. But what most people don't realize is that reef protection starts with things we do on land. Reefs are a vital part of the environment, so anything you do to help the environment helps the reefs. "Many people don't fully understand that they can take simple steps in their daily lives to improve the health of our reefs and our environment in general," agrees Brown.

The main areas of protection to focus on are surprisingly simple. Reducing waste and pollution keeps the water clean for coral reefs to grow healthily. Reducing soil erosion keeps excess sediment from choking and killing corals. Lastly, maintaining responsible diving, fishing and boating practices also keeps coral damage to a minimum. (See box below for details.)

Taking active steps to protect Guam's reefs is a main focus of the IYOR 2008 campaign here, which on island takes the form of the Guam Year of the Reef (Guam YOR). "The theme for the Guam YOR is 'Our Reefs, Our Future'," says Brown, who is also the Co-Coordinator of the event, helping to organize activities and maintain the website at www.guamiyor08.com.

The Guam YOR campaign has been in full swing with their Community PSA contest, where they invited members of the public to create their own Public Service Announcement about Guam's reefs. The booth at the Earth Day Festival on April 26 was also another way to engage and provide information to the public while the recent Coral Reef Symposium on April 19 offered opportunities for those interested in a more in-depth discussion of coral reef research and management topics.

"With the Guam YOR campaign we're trying to engage varied segments of the communities with a wide range of events from the Community PSA Contest and the Coral Reef Symposium, to trash cleanups at our beaches, streams, and reefs, and hopefully even some tree planting events once the wet season starts," says Brown. "We're hoping to encourage every person on Guam to do at least one thing to help protect our reefs."

Brown also foresees a need for more long-term initiatives to be implemented to help keep the momentum going long after 2008 is over. The key to that will lie in the next generation. "We need to incorporate environmental education into our school curricula," she says. "With a little creativity, environmental subjects can be easily integrated into reading, writing, art, music, and even math. It's important for our children to understand the value of our delicate island ecosystems and how to keep it healthy. Our environment is intertwined with every aspect of our daily lives, it ought to be intertwined with our children's education as well.

For the here and now, all of us on Guam should take responsibility for this beautiful island and the unique and wondrous ecosystems it supports. "We need to engage the public more in active stewardship of our marine environments. Government agencies can't do it alone. We need people in the community to stand up and take on the burden of leadership. Leaders that can help get people more engaged in the management of our resources, whether its through organizing trash cleanups and tree plantings, leading stream or reef monitoring efforts, developing educational messages, or changing the way their business operates to be more eco-friendly. Everyone in our community can do something to help improve our environment."

Ultimately, it's all about ownership and recognizing that Guam's reefs are more than an income- generating resource, they are a valuable part of the island's heritage and lifestyle. "Our reefs are an important part of not only our tourism economy, but also Guam's culture and traditions," reminds Brown. "We cannot afford to lose them."

Val Brown, NOAA

We must manage our coral reef resources wisely so that our children will be able to fish well into the future.

GET INVOLVED IN GUAM YOR

1. Cast your vote for your favorite Public Service Announcement on the website at http://www.guamiyor08.com. Winners will be aired on KUAM throughout the rest of the year.
2. Check out the presentations, posters and abstracts from the recent Coral Reef Symposium on the website.

For more information on how to get involved, attend a Guam YOR event or contact Val Brown at 671-735-4032 or guamiyor08@gmail.com

Coral facts

1. Corals are animals that most people mistake for rocks or plants. Coral reefs provide a home or shelter to millions of fish (many of which we rely on for food) and other marine animals.

2. Coral reefs are full of new and undiscovered biomedical resources that scientists have recently begun to explore.

3. Most established coral reefs are between 5,000 to 10,000 years old.

4. Corals grow .2 inches to 8 inches a year depending on the species, water temperature, water clarity, sunlight, and availability of food.

5. Experts estimate that one-third (1/3) of the world's coral reefs have been damaged or destroyed over the past 30 years.

6. Coral reefs are important protection for coastal communities. Its structure buffers shorelines against storms, waves, and floods.

Are we loving the reefs to death?

The impacts of recreational users on Guam's coral reefs

By Dave Burdick
Biologist, Guam Coastal Management Program

As most people are aware, Guam's coral reefs are an important part of the island's tourism economy. The reefs protect the shoreline from erosion and reduce the amount of storm damage inflicted on coastal buildings, roads, and other infrastructure. The sand that forms the stunning beaches that draw so many tourists to Guam is created from the shells and skeletons of a variety of animals and plants that live on the reef.

A large number of the more than one million tourists that visit Guam each year participate in some kind of recreational activity in our coastal waters. Scuba diving is a particularly popular activity on Guam, with an estimated 300,000 dives occurring here each year, but snorkeling, Snuba, SeaWalker, ScubaBob, submarine tours, and wading and swimming are also popular reef-related activities. The number of recreational users on Guam's reefs will likely increase significantly in the near future with the additional military personnel, their dependents and others associated with the military expansion.

But is it possible to have too much of a good thing? Are we loving the reefs to death? Corals and other marine organisms can be injured by wayward fins, curious hands and tired feet. Coral tissue, in particular, is thin and fragile, and can be injured when pressed even lightly against the sharp skeleton below. Touching coral also removes some of the protective mucus layer covering the colony. When you remove some of this mucus, the coral has to spend precious energy to replace it and can become more susceptible to injury from sediment, diseases and other threats.

It's difficult to determine exactly the impacts of recreational users on the health of Guam's reefs, but it's safe to say that the impacts are concentrated in relatively small areas, and that they don't affect a very large percentage of Guam's total reef area. However, it just so happens that these small areas of reef are home to some of the most beautiful, most easily-accessible, and most valuable pieces of "reef real estate." The degradation of these relatively small, but exceptionally valuable, reef areas has a direct impact on the long-term viability of the businesses that depend on these sites to draw tourists.

Poor reef etiquette

The impacts of recreational users (not all of whom are tourists) can be seen at sites like Ypao Beach and Fish Eye Marine Park, both of which are within marine preserves. If you visit these sites, it won't be long before you see someone walking across live coral, kicking and breaking coral, grabbing coral with their hands, or kicking up lots of sediment that falls on corals and other bottom-dwelling sea life.

These behaviors are also routinely observed at popular boat diving sites, such as Blue Hole, Hap's Reef, Finger Reef and Western Shoals. Some commercial dive boats and other boats are occasionally observed dropping their anchors on areas with lots of coral growth, and the coral damage from this practice is clearly visible at some of these sites. While some dive operators and operators of other types of reef-recreation businesses are responsible and recognize the importance of keeping the reefs healthy, others display a lack of awareness or even a disregard for their impacts on the reef. Some dive guides, for example, are regularly observed encouraging their clients to grab or sit on coral colonies while feeding fish in the Piti Bomb Holes Marine Preserve.

Before I continue, it's important to keep in mind that many of these recreational users, as a result of their exceptional understanding of, and connection with, the reef ecosystem, are often important advocates for the preservation of coral reefs and other marine ecosystems. For example, many divers on Guam volunteer for regular marine debris clean-ups and have participated in the deployment of mooring buoys aimed at reducing the amount of anchor damage at popular dive sites. So I want to be clear that I'm not pointing fingers here, and that I am cognizant of the important role that recreational users can play in the protection of the reef environment. But there clearly is room for improvement, and raising awareness about the impacts of some recreational users on Guam's reefs is the first step in addressing the problem.

Part of the problem is simply a numbers game: the more people out on the reef, the more chances there are of having some level of impact. But it's made much worse by improper reef behavior, also referred to as poor "reef etiquette." This might include divers kicking coral, swimmers standing on coral, kayakers running aground on coral, divers and snorkels trampling over seagrass beds, etc. We've even seen "reef graffiti," where divers use a knife to carve their name in the living coral.

Some of this poor reef etiquette is accidental and some is a result of ignorance – some people simply don't know that coral is alive and that they're not just colorful rocks. And, of course, there's always the small number of "bad seeds" that do stupid things even when they know better. But the good news is that many of the observed impacts can be avoided if we get the message out, while also providing some incentives, and perhaps some punishments, to help influence the behavior of those of us who just don't seem to get it.

So when do we know if it's just too much for the reefs to handle? That's a tough question to answer, but we can get an idea by looking at the results of several scientific studies conducted at other reefs in the world that host a large number of recreational users. These studies, which focus on divers, in particular, suggest that dive sites that host more than 4,000-6,000 dives year may start showing signs of degradation directly attributed to the presence of divers. There are a handful of dive sites on Guam that are believed to receive many more divers than the suggested "threshold value" of 4,000-6,000 divers. In fact, an estimated 50 to 200 dives occur daily in a small area of reef near the Fish Eye Marine Park alone – that's between 18,000 and 70,000 dives each year! Another concern is that most of the divers at Fish Eye and other shallow, protected sites are open water students or resort divers who typically have poor buoyancy skills and who tend to cause more damage to reef life than more experienced divers.

I've picked on snorkelers and divers a lot here (hey, I'm a diver!), but they certainly are not the only recreational users that impact reefs on Guam. Other users, such as swimmers, waders, fishermen, paddlers, windsurfers, kite surfers, surfers, and others have the potential to damage reef habitat. So it's up to all of us, regardless of our ocean sport of choice, to ensure that our activities don't harm the very resource that provides us income, enjoyment, food, etc. But with that said, commercial operators have an extra obligation to ensure that the reef sites that support the existence of their enterprise aren't negatively affected by the activities they conduct at those sites. Commercial operators can have a great amount of influence over the behavior of their clients, and it's important that they educate their clients, and help them interact with the reef in a proper manner.

The use of motorized personal watercraft (PWCs), such as Jet Skis, Wave Runners, etc., is another recreational activity that has received some attention in recent years for its potential impacts to coral reefs and because of conflicts with other recreational users. Although these craft are loud, are known to leak fuel, and have the potential to scour seagrass beds and corals, the results of a 2006 study by PCR Environmental, Inc., showed no significant effect on water quality or biological communities in East Agana Bay. However, it was clear that certain issues regarding PWC use needed to be addressed in the update of the Recreational Water Use Master Plan in order to reduce conflicts with other stakeholders, such as allowing for the closure of commercial PWC activity during the seasonal manahak runs.

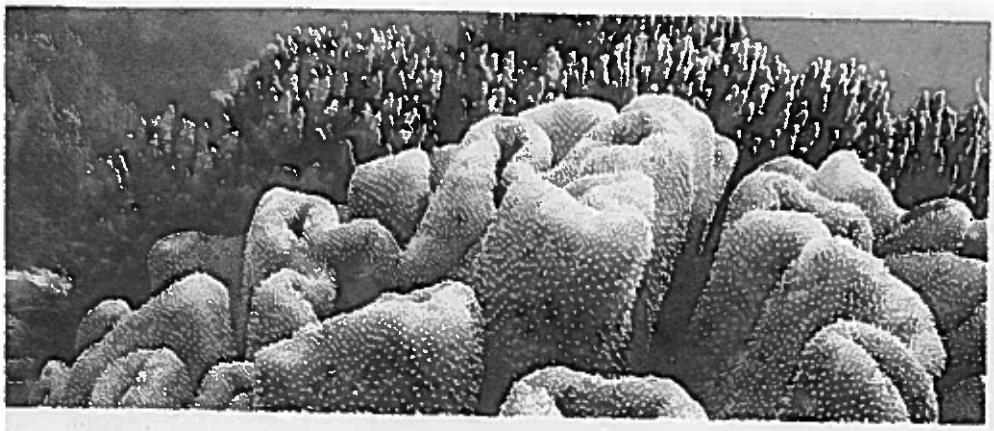
Exercising responsibility

Beyond the individual responsibility that each recreational user – myself included – must exercise when interacting with the reef environment, local and federal government agencies, non-governmental organizations, and others are carrying out programs and developing policies to help address concerns about recreational user impacts to coral reefs. One of the biggest advances towards reducing the impact of recreational users is the development of an eco-permitting program that allows the Department of Agriculture to regulate non-fishing activities within the marine preserves. The idea is that a reasonable level of recreational activity will be allowed within the preserves, and a certain standard of reef etiquette must be abided by in order to obtain a permit to operate commercial activities within these areas. Information about prohibited behaviors (e.g., standing on coral, grabbing coral, etc.) will be provided to commercial recreational operators, and other interested recreational users, at regular workshops, similar to a recreational impacts workshop conducted in 2005. The Department of Agriculture has been granted legal authority over the eco-permitting program, but the approval of rules and regulations has been sluggish. It is hoped that they become effective some time in 2008.

Another project aimed at reducing the impacts of recreational users on Guam's reefs include an upcoming study to identify alternate sites for introductory scuba classes, which will reduce the impact of inexperienced users in areas like Fish Eye and Ypao Beach. Outreach to tourists has also been a focus in recent years, with an in-flight video aimed at educating tourists from Japan about how to enjoy the reef without harming it and the installation of kiosks along Tumon Bay that provide information about the marine life in the preserve. However, there also needs to be much more outreach to tourists, commercial operators, hotel managers and staff, and individual recreational users if this issue is to be adequately addressed. The bottom line is this: we all need to work collectively towards protecting a resource from which we all benefit.

Above: Two divers enjoy a reef in southeastern Guam. Reef-conscious divers keep a safe distance from the reef and avoid touching corals and other marine life.

At left: A dive guide instructs her clients to grab a large coral colony in the Piti Bomb Holes Marine Preserve. The repeated grabbing of living coral can kill portions of the colony over time, and can leave the coral more susceptible to diseases.



Guam's Reefs are Important to Guam's Culture and Economy

ou know how much Guam's reefs are worth? You may be surprised to that they are worth $127 million a year. But that's just the monetary e. There are additional cultural values associated with our reefs that is cult to quantify in terms of dollars.

might ask, how did we get this number? It all started in 2004 when the rtment of Agriculture's Division of Aquatic and Wildlife Resources , njunction with the National Oceanic and ospheric Administration, Guam Coastal agement Program, and the University of n Marine Laboratory, invited Dr. John n, a well respected resources economist to Guam. During his visit, Dr. Dixon met many stakeholder groups including repre- tives from the fishing community, federal erritorial government agencies, dive opera- hotel and restaurant representatives, and rnor Felix Camacho, to discuss the uses, users, and threats to Guam's reefs and their adjacent habitat. The result of this visit was a scope of to guide a Guam Coral Reef Economic Valuation Study (CREVS).

CREVS Steering Committee hired Herman Cesar and Pieter van ering of Cesar Environmental Economics Consulting (CEEC) to con- he study. CEEC established a multidisciplinary team that included Environmental in Guam and Simon Fraser University from Canada. tudy focused on four main topics:

- ople's relationships with marine ecosystems
- al willingness to pay for coral reef con- ion
- e economic importance of reefs
- e spatial variation of reef- ciated values and threats

Want to learn more?

For more information about this study please contact Val Brown at 671/735.4032 or Valerie.brown@noaa.gov or see the Guam Year of the Reef Website: http://www.guamyor08.com

The researchers used many techniques to determine this value including household surveys, a discrete choice experiment, and analysis of data such as tourist exit surveys, and fisheries data collected by local agencies. With this information they determined the TEV or Total Economic Value for Guam's Coral Reefs.

The results indicated that Guam's reefs are worth $127 million per year. The main contributor is the tourism industry which results in nearly $95 million per year. Other values include amenity value, recreation, coastal protection, fishery, and research/ education. The researchers found that certain areas of Guam's reefs are worth up to $15 million per year per hectare. The rest of the reef is worth an average of $2million per year per hectare.

Perhaps more importantly, the results of the household survey and discrete choice experiment clearly illustrated that Guam's community still believes that coral reefs are culturally valuable. It is very difficult to put a monetary figure on this value, but the study did recommend that Guam's resource agencies take this value into account when developing management strategies.

The researchers made four overall recommendations:

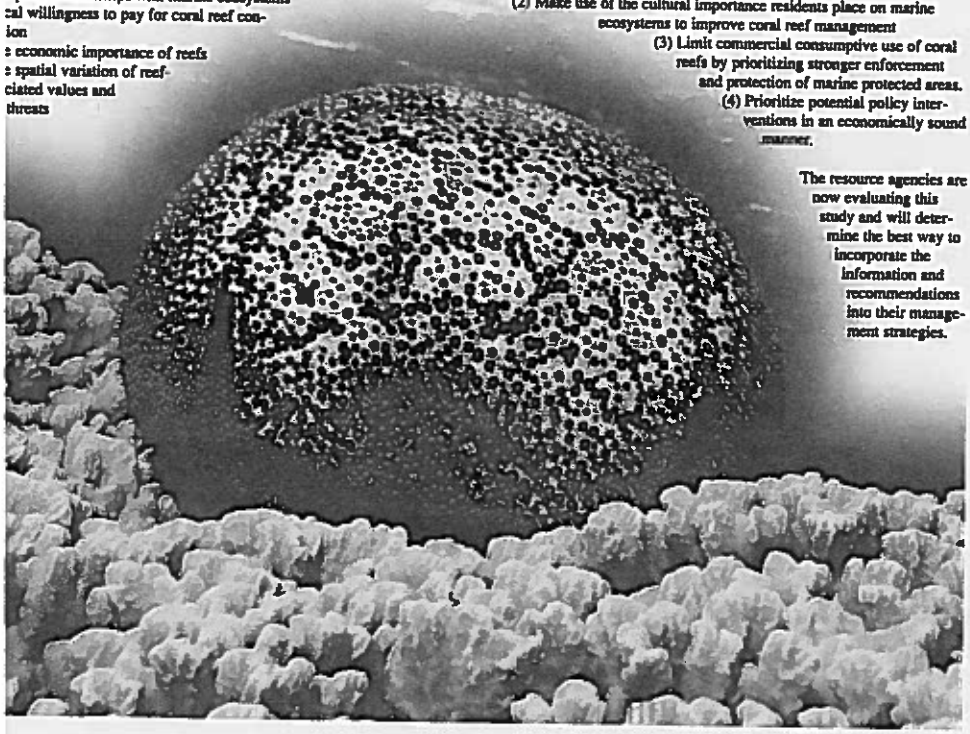
(1) Actively involve the tourism industry in the development of sustainable coral reef management.

(2) Make use of the cultural importance residents place on marine ecosystems to improve coral reef management

(3) Limit commercial consumptive use of coral reefs by prioritizing stronger enforcement and protection of marine protected areas.

(4) Prioritize potential policy interventions in an economically sound manner.

The resource agencies are now evaluating this study and will determine the best way to incorporate the information and recommendations into their management strategies.



HOW TO HELP PROTECT OUR REEFS

(AND THE ENVIRONMENT AS WELL)

1. Pick up trash. Waste and litter can all end up being washed into ocean, polluting the marine environment and killing off our corals.

2. Take a stand against wildland arson. Every time a hunter burns land, he decreases plant cover, increases soil erosion and the amount of sediment that will wash into the ocean, killing off coral reefs. Report wildland arson to DAWR at 735-3991/3955.

3. Assist the resource agencies by monitoring your watershed or a favorite reef

4. Practise responsible fishing – take only what you need, no more. Leave the fish to contribute to the next generation.

5. Plant a tree. Increasing vegetation and plant cover helps decrease soil erosion, limiting the amount of sediment that will find its way into the sea to smother corals.

6. Talk to your senators and ask for stronger reef protections like penalties for boat groundings and stronger natural law enforcement.

7. If you enjoy boating, make sure you use the island's shallow water mooring buoys (SWM) to avoid damaging coral with your anchor.

8. If you dive, be careful around fragile coral and avoid touching or stepping on them.

9. If you fish, don't leave your fishing gear behind. Abandoned fishing gear can kill.

10. If you off-road, do it responsibly. Check out www.treadlightly.org.

Sea Turtle

continued from page 1

private property owners have been very helpful to our efforts, allowing access to nesting beaches. I am very proud of the way our people have responded to our calls to help save one of Guam's natural treasures. We have to do it for our children, for our future to preserve what is Guam."

Volunteers of all ages receive training on what signs to look for as they patrol the island's beaches; this is a year-round activity. They collect data to establish a baseline of nesting turtle cycles on Guam.

"A baseline," Wusstig explains will tell us a number of things like what the nesting cycles are, when the nesting season occurs, and other things that will help us prepare strategies to facilitate and protect the endangered sea turtles." Wusstig says that the sea turtles need our assistance if they are not to disappear from our waters.

"The odds are already stacked against the turtles. The Hawksbill Sea Turtle is even under more intense pressure than the Green Sea turtle, but they are both in trouble from they day the eggs hit the sand.

"Only one in a thousand eggs will ever make it to the adult stage. Turtles are threatened for a number of reasons including feral (or stray) cats, wild pigs, crabs, monitor lizards, birds, human poachers, and off-road vehicles.

"These are just some of the challenges that eggs and hatchling must face – and that is before they even get into the water where other predators are waiting for them."

Wusstig says that some of the other hazards that threaten the safety of Guam's sea turtles and their babies include trash and litter on the beach and in the water. Plastic bags are frequently mistaken by the turtles as something edible and later die from complications from ingestion. Carelessly leaving fishing nets behind or unattended could cause a turtle to get caught and drown.

For hatchlings, lights can present another problem. Young turtles that emerge from the sand depend on natural light and reflection off the nearby waters to guide them to the open sea. Bright yard lights ... exterior home lights can confuse them and send the little wanderers in the wrong, and often deadly, direction. Today, many places that were once home to nesting sea turtles are now hotels, apartments and condo hi-rises. Sea walls prevent turtles from reaching suitable nesting sites and loud noises and bright light further frighten a mother turtle preventing her from nesting.

Turtles grow very slowly usually taking between 25 and 30 years to reach sexual maturity. They also return to the place where they were hatched. Imagine those turtles that were born on Guam several decades ago who are making their way back now to nest. What will they find in their nesting grounds? Will they even find nesting grounds or will they find a parking lot, swimming pool or hotel?

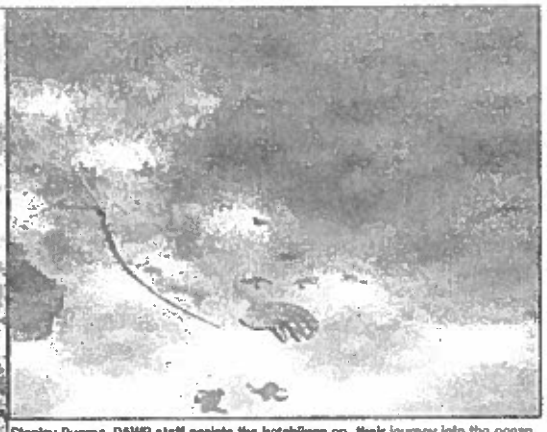
"Education is key," Wusstig affirms. "We must demonstrate to the people the role they play in the future of the sea turtle and our island's overall ecological health and welfare."

"My husband and I find being a part of Haggan Watch very rewarding; being a part of a dedicated group helping to save the Sea Turtles of Guam, through Data collecting, satellite tracking, to counting eggs being dropped into a nest on Mothers Day has been truly an experience of a life time." – Lorie Hanson

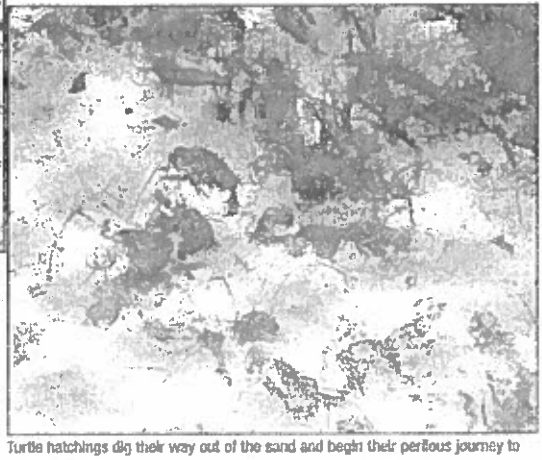
"In the over two years that my wife and I have been searching the beaches of Guam, could have not prepared us for the Mothers Day eve of May 2006 when we witnessed a female Green Sea Turtle come ashore and dig seven nest before she laid about 128 eggs at a arms length away from us. This turtle finished her labors early in the morning Mothers Day 2006, A mothers day my wife and I will never forget." – Mark Hanson

Haggan Watch volunteers Mark and Lorie Hanson (left) with Alisha Molyneaux observe a nesting turtle in background.

DAWR staff Shawn Wusstig observes a nest hatching, and the first hatching digging its way out of the sand.



Stanley Dupree, DAWR staff assists the hatchlings on their journey into the ocean..



Turtle hatchlings dig their way out of the sand and begin their perilous journey to sea.

Photo courtesy of the Guam Dept of Agriculture DAWR Guam Sea Turtle recovery program

Hidden Haggan Touring Turtles on Guam

By Krista Gaza

Twenty touring turtles lay hidden and waiting to be discovered throughout the island of Guam. No, it's not the tides! These life-size happy *haggan* are works of art painted, prepped and all dressed up for the residents and tourists alike by budding artists, and designers, including several schools and youth organizations.

In celebration of the "International Year of the Sea Turtle" the Guam Coastal Management Program, Guam Environmental Education Partners, Inc., UnderWater World and the Guam Visitors Bureau introduce an opportunity to get involved with a comprehensive environmental educational program, to appreciate and protect these endangered animals of both culture and heritage here on Guam. Twenty fiberglass turtles will be painted and nested by students from all over our island. These beautifully decorated turtle replicas will then be purchased by corporate sponsors and donated in the name of their favorite charity and put on display for locals and tourists to enjoy.

Maps of individual turtles and their fabulous "nesting sites" will be made available at sponsor locations and through GVB's Winter Packet promotion for our visitors in November. Look for the "Hidden Haggan" in parts of the island that reflect Guam's culture, heritage, beauty, and businesses during the exhibit. Site maps will feature a fun questionnaire directing visitors and the community to turtle sites. Completed questionnaires can be redeemed for premium items and aquarium passes to UnderWater World.

Additional coordinating events are in full swing to promote conservation and awareness of these turtles. The Agana Shopping Center will become a Haggan haven with the first of three promotional events. Plans include a Halloween Haggan, a Holiday Haggan Craft Fair, and a Holiday Haggan Fun Run 5K to culminate our efforts in supporting the preservation of sea turtles.

How to Get Involved: Interested in becoming a Hidden Haggan sponsor, designer, or simply helping out? Send email to Krista Gaza at kristagaza@yahoo.com, call 789-6215, or contact the Guam Coastal Management Program at 472-4201/2/3.

Top left: 5 year old Judah [illegible] poses with a Green sea turtle. Below: Krista Gaza and son Duke admire the life like fiberglass turtle.

"Our Coasts. Our Future."

Kiker's Kid Page

WORD FiND

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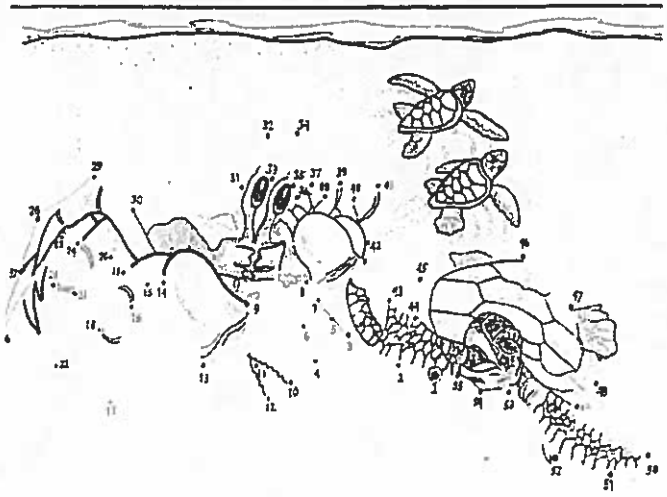
WORDS

REPTILE	CARAPACE	ENVIRONMENT	CRAB
SCUTES	HATCHLING	SPONGES	PLASTRON
BARNACLES	MOLLUSCS	CARNIVORE	TAGGING
JELLYFISH	MARINE TURTLE	CRUSTACEAN	SHRIMP
MIGRATION	PREFRONTAL SCUTES	PCP	TURTLE EGGS

CONNECT THE DOTS



Kid Territory: Crafts : **Make a Trash Puppet!**

See turtle marionette

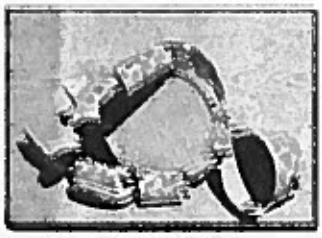
What you need:

(You can substitute anything you have that is similar to these items.)

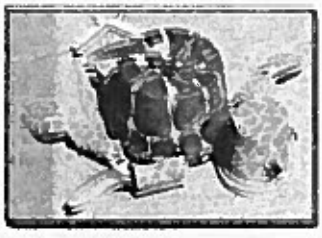
- 1 clear plastic deli container with a snap-on lid, like the ones that parmesan cheese comes in. This is the turtle's shell.
- 4 plastic spoons to make the flippers. Carefully break off the handles of the spoons, leaving only about one-half inch of the handle and the scoop part. An adult could also snip off the handles with wire cutters, but don't try that yourself.
- 1 plastic container from individual-size pudding cups. This is the turtle's head.
- 4 wine bottle corks for legs
- 4 buttons–2 for eyes, 2 for anchors for your marionette strings.
- 1 piece of sponge for the turtle's tail
- 5 twist ties
- 2 popsicle sticks for your marionette control
- 4 small screw eyes to connect the legs to the shell
- Thick white glue
- Nail
- Hole punch–the kind you hold in your hand
- Heavy thread
- Acrylic paints, if you'd like to paint your turtle

What you do

1. Legs and flippers: Cut a small slit in one end of the cork. You might want an adult to help you. Push the shortened spoon handle (flipper) into the cork. On the other end, twist the screw eye into the cork. Repeat for the other three corks.



2. Head: Use the nail to punch a hole into the bottom of the pudding cup. You will later thread a control string through here. Use the hole punch to punch a hole near the rim of the cup. This is where the head will connect to the shell. Now turn the cup over so the opening is downward. This is how the head will be placed. Glue two buttons to the front for eyes (the punched hole is in the back).



3. Shell: Take the lid off of the container. Use the nail to punch a hole in the center of the bottom of the container. This is for your control string. Now use the hole punch to punch five holes around the rim, one for the head to connect and four for the legs to connect. Keep the holes closer to the front than to the back. Now punch five holes in the container lid, in the same places as those in the container.

4. Tail: Cut a small triangle from the sponge. Glue it on to the back of the container, down near the rim.

5. Control: Glue the two popsicle sticks together in a T shape and let dry.

6. Paint: Paint each piece and let dry. Make the mouth pointed. Paint the "scutes," or sections of the shell.

7. Strings: Cut 6 pieces of heavy thread, each one about 18 inches long. Head string: Tie one end of a thread onto a button. Thread the other end up through the pudding cup until it rests on the button (it will kind of look like a bell on a string). Shell string: Repeat for the other button and thread it up through the small hole in the container. Now snap the lid on the container, making sure you match up the large holes you punched for the neck and legs.

8. All together: Use a twist tie and thread it through the large hole in the pudding cup, then the holes in the front of the container and its lid. Twist to secure, but not too tight. The head needs to be able to move freely. Next attach a leg and flipper by threading a twist tie through the screw eye, and then the large leg holes in the container and lid. Be sure the spoon is turned so the rounded part is facing up. Repeat for the other three legs/flippers. All the legs will point toward the back of the turtle.

9. Strings on the control: Tie a thread around each of the flippers where the handle of the spoon meets the cork. Now attach everything to the control. It's easier if you have someone to help hold the control as you tie on the strings. Tie the shell (body) thread to the crossed part of the T. Tie the head thread to the very end of the long center stick of the control. Gather the two threads for the flippers on the right side of the turtle and tie them to the end of one of the cross pieces of the T. Repeat for the left side. Be sure your turtle's legs are even with his body as shown, so it looks like he's swimming. Put a dab of glue on all your knots, and on the control to keep the strings from slipping off. Let it dry. Cut off any excess thread and you're ready to swim the seas! Tilt the control from side to side and watch what happens. With a little practice, you can make your turtle really look like he's swimming.

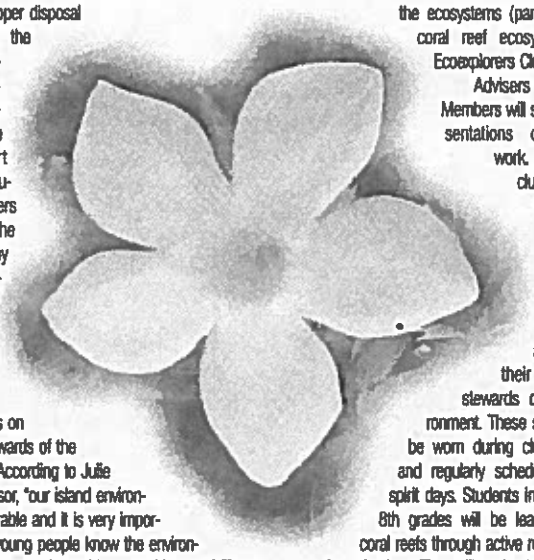
BMS and FBLG form Eco Clubs

The Guam Coastal Management Program is working with a newly formed group of island science teachers in the establishment of environmental clubs. GCMP provided seed money to start the clubs in the pilot schools. The Eco Clubs will focus on educating students on the importance of protecting and preserving Guam's coastal environment for future generations. The clubs will work with GCMP and with the appropriate networking agencies in developing appropriate curriculum and activities.

The two schools that have submitted their proposals to foster environmental stewardship are from FB Leon Guerrero and Benavente middle schools.

The FBLG WAVE/Explorers Club proposal will foster the idea of stewardship by enabling club members to participate in a campus beautification project. The FBLG/WAVE Explorers club is a school organization whose purpose is to promote the exploration and appreciation of our environment by participating in projects that promote tourism and environmental awareness. This project will organize the club to beautify the FBLG Yigo campus. It is hoped that if students participate in the project they will become more involved in making sure the campus maintains its improved appearance. The ultimate goal is to promote the idea of stewardship among the participants.

The project will concentrate on two elements in promoting campus beautification. The first part will organize a cleanup and maintenance program. The club will organize a series of school cleanups for its members and interested students during team time or Saturdays. This portion will also arrange the distribution of trashcans around the campus to encourage proper disposal of trash and the support student efforts to beautify the campus. The second part will have student members beautify the campus by painting designated areas.



The BMS Ecoexplorers Club will focus on becoming stewards of the environment. According to Julie Flis, Club advisor, "our island environment is vulnerable and it is very important that our young people know the environment, its importance, its problems, and its care." The members of the club (from all three grade levels) have participated in cleanups, planting fieldtrips, and ecological observation fieldtrips. Some of our members have participated from 6th grade through 8th grade.

The club sponsors the school science fair and the member's work preparing for and assisting during the fair. They have worked on making other students aware of the coral reef and different environmental issues. The current proposed projects will be covered in this school year.

Interactive Multimedia Creation/Interclass Environmental Forum

In order to promote studies of the ecosystems (particularly the coral reef ecosystem), the Ecoexplorers Club Advisers and Members will sponsor presentations of student work. Additionally, club members will be provided a t-shirt to recognize their contribution and affirm their role as stewards of the environment. These shirts would be worn during club activities and regularly scheduled school spirit days. Students in 6th, 7th, & 8th grades will be learning about coral reefs through active research and investigations. They will work with their team teachers to select a specific aspect of the coral reef ecosystem they can investigate. They will research their topics using the internet and other resources.

Students will be preparing presentations (poster displays and multimedia) in their classes. Teachers will select the best presentations for students to share at the end of the school year (2005-2006) to other levels through the Ecoexplorers Club as an Interclass Environmental Forum. Special awards will be given to students with the best presentations. Possible topics include an introduction to coral reef ecosystem, ocean-related careers, organisms found in Guam's coral reef, and issues related to the health of Guam's coral reef.

Environmental Awareness Fieldtrip

Advisors of the Ecoexplorers Club will set up an Environmental Awareness fieldtrip to several sites on Guam for 50 students from all grade levels (6th, 7th, & 8th). These sites could include the Ordot landfill (solid waste), the sewage treatment plant (possible water pollution), Leo Palace resort (wetlands conservation), and the Maui Tunnel (aquifer). Following the fieldtrip, students will prepare a display regarding what they have learned. The students will then present their display to their classmates.

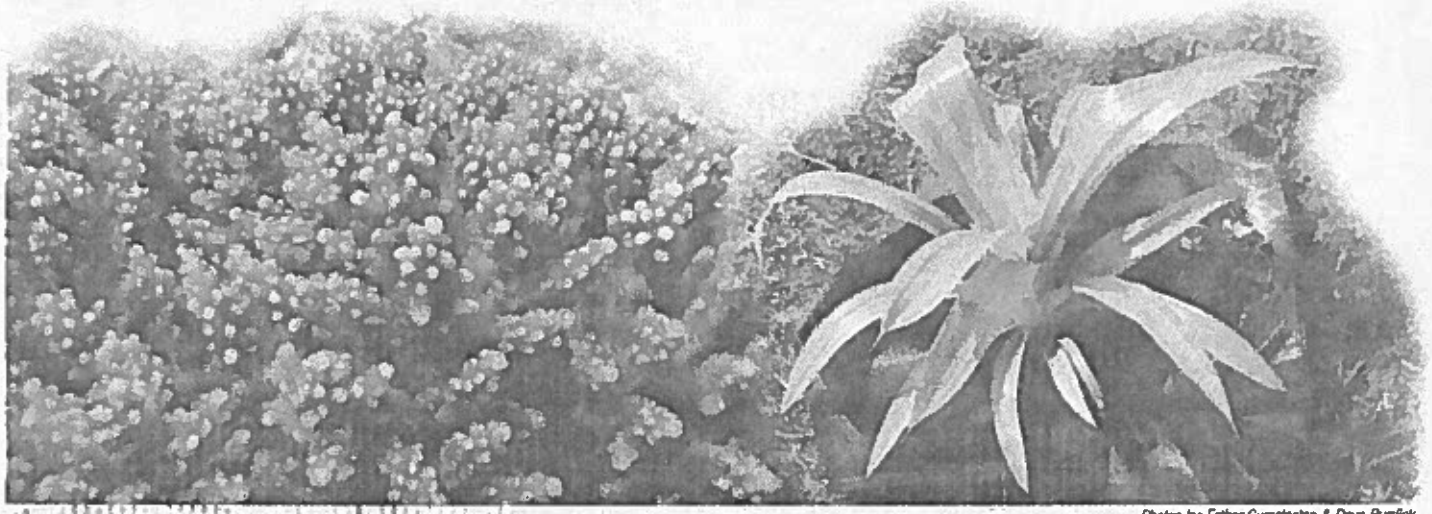
Tree Planting Fieldtrip

Advisors of the Ecoexplorers Club will set up a fieldtrip with the Department of Agriculture so students can plant trees at Ugum Watershed area or other sites similar to this. Students will learn about the savanna ecosystem; what problems are occurring in this area; how these problems may affect other areas such as the coral reefs; and what possible solutions are available. Following the fieldtrip, students will prepare a display regarding what they have learned. The students will then present their display to their classmates.

Beach Cleanup

Advisors of the Ecoexplorers Club will set up a beach cleanup fieldtrip. Students would learn about the importance of actively working on cleaning their environment particularly the beach area. Teachers would provide students with a data collection sheet so they could record the type of trash found. Following the fieldtrip, students will prepare a display regarding what they have learned. The students will then present their display to their classmates.

For more information, contact Esther Gumataotao at 475-9670 or egumataotao@mail.gov.gu via email.



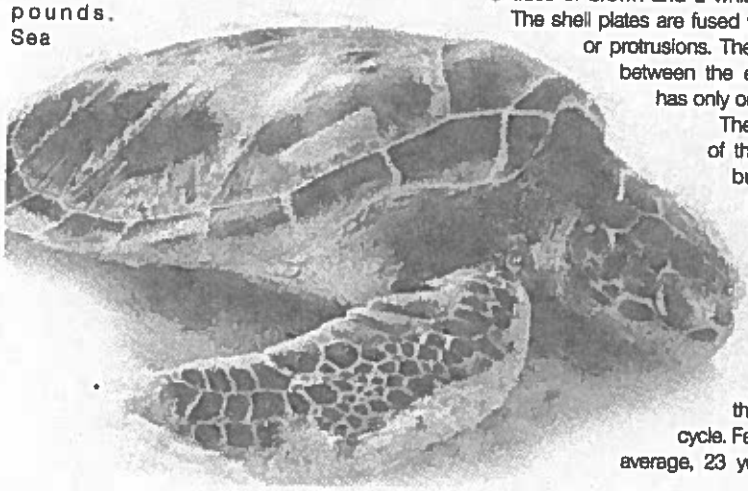
Photos by: Esther Gumataotao & Dave Burdick

What in the World is This?

HAGGAN: GREEN SEA TURTLE

Threatened Species (Federal); Endangered Species (Guam) Native Resident

The green sea turtle or "haggan" is the most commonly sighted turtle in Guam's waters. They frequent the shallow reef areas around Guam while foraging for marine algae and seagrass. Fully grown adults can have a shell length of four feet and can weigh over 300 pounds. Sea turtles are long lived animals and grow reasonably slow averaging about 0.4 inches a year until mature and then 0.2 inches. Using these growth rates, the larger adults are well over 50 years of age. The haggan is characterized by a shell colored with mottled shades of brown and a white to yellow underside. The shell plates are fused with no overlap, points or protrusions. The head has two plates between the eyes and each flipper has only one claw.



These turtles spend most of their lives in the ocean but once adults, will return every few years to the beach where they were born. Mating takes place a month or two prior to egg laying near the nest site and mating continues through the egg laying cycle. Females must be on the average, 23 years old to reach 32 inches, the average size at first maturity. The female, once fertile, will crawl onto a sandy shoreline and use her flippers to dig a large pit above the high-water line near some vegetation. She will lay between 40-140 eggs depending on her size, and then cover them with sand. A female can lay as many as six clutches of eggs in one nesting season, which runs from April through July on Guam. The eggs take 50 to 90 days to hatch depending on conditions. The eggs will hatch near sunrise when two-inch long hatchlings emerge from their eggs, dig up through the sand, and start their journey to sea. Haggan still nest on some of Guam's more remote beaches throughout the island.

Turtle meat and turtle eggs were once prized food sources on Guam. The shells were used for decorative purposes. World-wide concern for over-harvesting resulted in the haggan being listed on the Federal Threatened Species List and Guam Endangered Species List. It is illegal to capture, harass, possess, buy, sell, or transport the haggan or any part thereof including but not limited to eggs, shells, shell jewelry, and meat.

Source: Dept of Agriculture, DAWR

HAGGAN KARAI: HAWKSBILL TURTLE

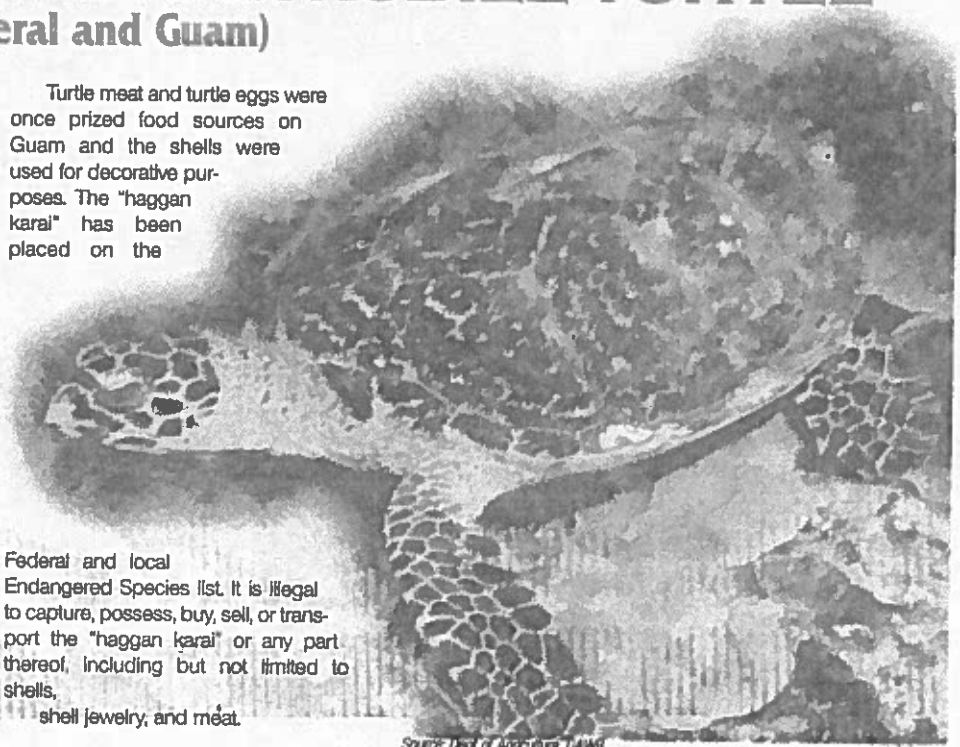
Endangered Species (Federal and Guam)

The hawksbill sea turtle, or "haggan karai" as it is known in Chamorro, is less common around Guam than the green sea turtle (haggan), but is not considered rare. Considerably smaller than the haggan, a fully grown haggan karai reaches a weight of only about 100 pounds with a maximum shell length of 2.5 feet. The haggan karai feeds primarily on sponges and therefore is most frequently observed in harbors and lagoons where sponges are abundant.

The upper surface of the haggan karai is mottled brown and the underside is straw yellow. The shell plates and edges overlap forming a semi-jagged edge toward the back end of the shell. There are four plates between the eyes and two claws on each flipper.

Haggan karai spend most of their lives in the ocean, but every few years will migrate back to the beach where they were born. The female crawls ashore on a sandy beach and uses her flippers to dig a large hole in the sand above the high-water line near some vegetation. She lays about 100 eggs which she covers with sand. The eggs take about 60 days to hatch. Near sunrise, the two-inch long hatchlings emerge from their eggs, dig up through the sand, and start their journey out to sea. Haggan karai" still occasionally nest on Guam.

Turtle meat and turtle eggs were once prized food sources on Guam and the shells were used for decorative purposes. The "haggan karai" has been placed on the Federal and local Endangered Species list. It is illegal to capture, possess, buy, sell, or transport the "haggan karai" or any part thereof, including but not limited to shells, shell jewelry, and meat.



Source: Dept of Agriculture, DAWR

12th Annual Guam International Coastal Cleanup

Guam International Coastal Cleanup (ICC) September 16, 2006:

- 30,927 pounds of garbage were collected in less than 4 hours.
- About 3,000 volunteers cleaned 15 shorelines and 2 dive spots.
- Volunteers were treated to free admission at the UnderWater World and Fisheye Marine Park for the day.
- The top three most collected items by volunteers on Guam were:

1. Beverage cans – 19,723
2. Cigarette butts – 18,023
3. Plastic bags – 8,442

More Guam ICC Facts:

- A total of 12 International Coastal Cleanup events have been conducted (1995-2006).
- On October 14, 1995 Guam participated for the first time with approximately 450 volunteers, who cleaned three areas of Guam: Ylig Bay, Agat Marina to Inn on the Bay, and Dungca's Beach. Volunteers collected 34,172 pieces of trash totaling 8,537 pounds, and recycled 467 pounds of aluminum cans.

Special thanks from the Bureau of Statistics and Plans, Guam Coastal Management Program to the sponsors and groups who contributed in many ways:

UnderWater World, Foremost Crystal Clear, Coca Cola Beverage Company, Fisheye Marine Park, Ambros, Inc., Pacific Daily News, Tri Vision Media, Guahan Waste Control, Pacific Waste Systems, Micronesian Divers Association, Sunny Wholesale, Triple Star Recycling, Lagu Sanitation, Guam Cell Communications, Trash Co., Morrico Co., Guam Tropical Dive Station, Guam Visitors Bureau, Western Pacific Regional Fishery Management Council, Guam Community College, Guam Environmental Protection Agency, George Washington High School's Marine Mania; and the Mayors from Tamuning, Dededo, Agat, Merizo, Inarajan, Umatac, and Yona.

For more information regarding the Ocean Conservancy, please visit http://www.oceanconservancy.org/site/PageServer?pagename=press_icc.

The International Year of the Sea Turtle

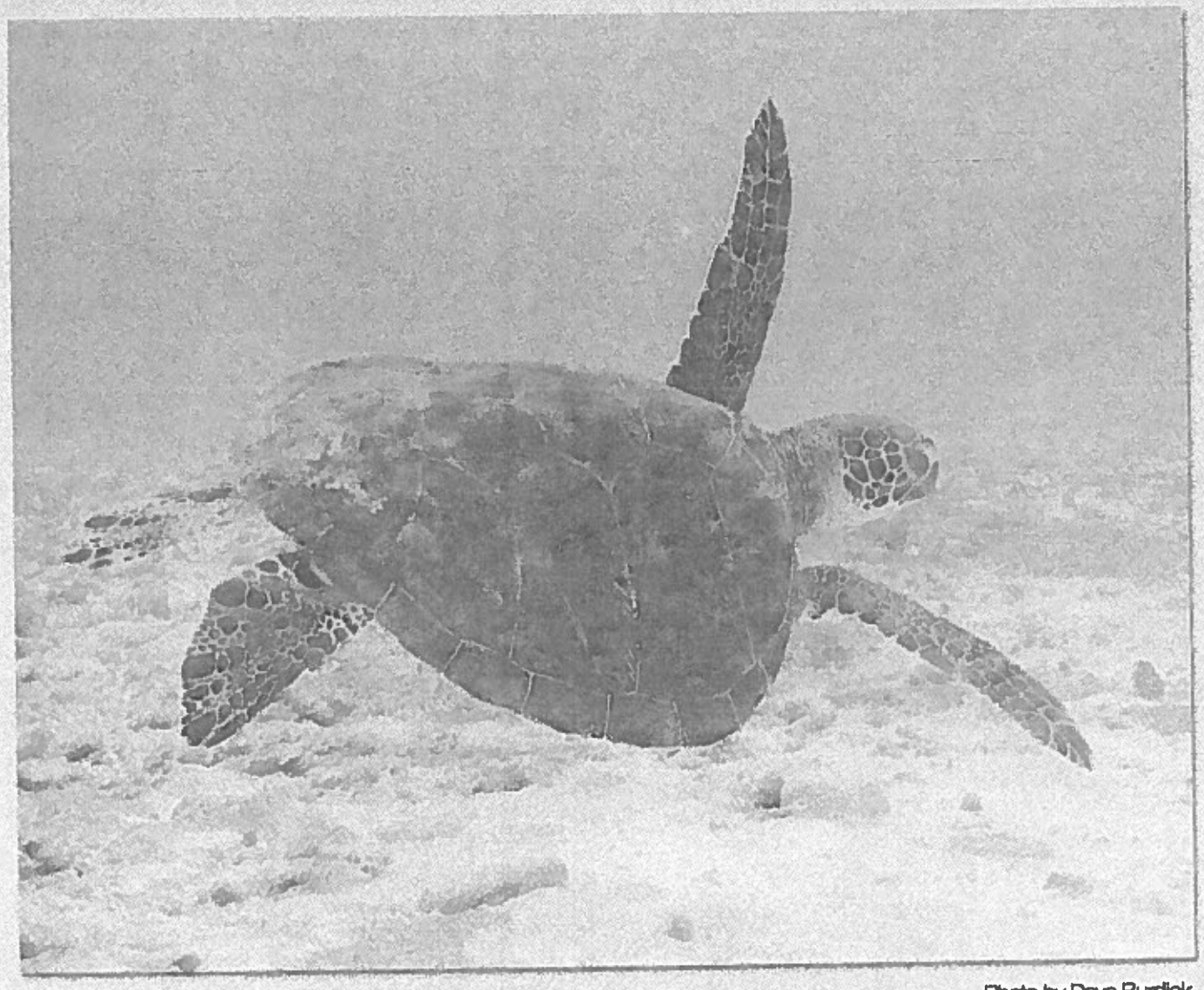


Photo by Dave Burdick

This majestic Green Sea Turtle swims in Guam's waters.

MAN • LAND • SEA
News of Guam and her Ocean Environment
Volume 1 • Issue 2

Guam's Aquifer:
Do you know where your water comes from?

By John Jocson

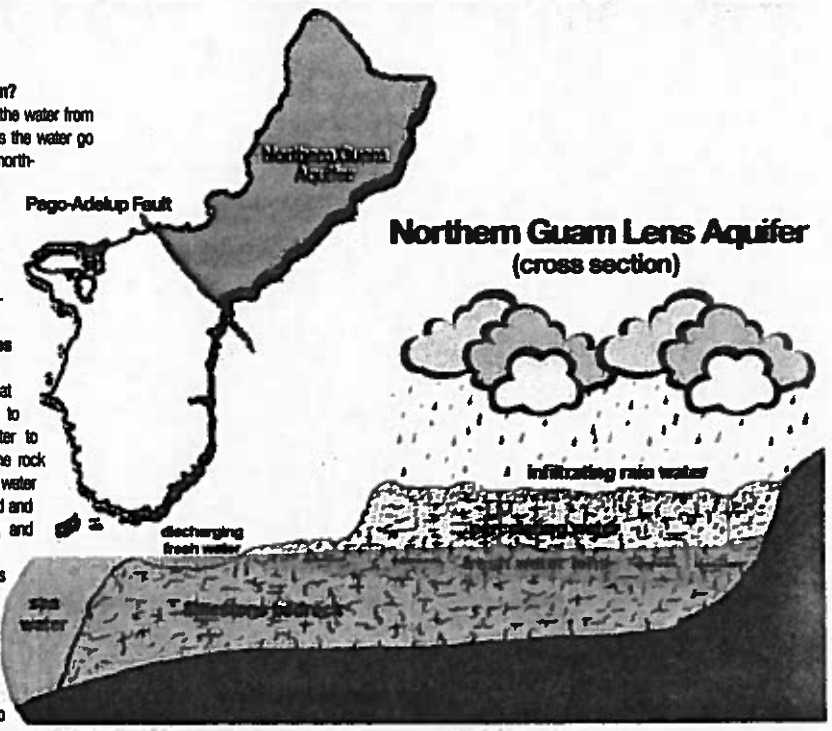
Where does your water come from?

Have you ever wondered where the water from your faucet comes from? Where does the water go after it rains? If you live in central or northern Guam, the answer is the Northern Guam Aquifer. But what is the Northern Guam Aquifer? What is it made of? How does the water get from the aquifer to your house? How big is it? How much water can it produce and how can we protect it?

What is the Aquifer and how does the aquifer work?

An aquifer is a rock formation that is saturated and permeable enough to transmit economic quantities of water to wells and springs. This means that the rock formation holds lots of water - enough water that you can pump it out of the ground and use it to supply houses, agriculture, and other uses.

The permeable rock that makes up the Northern Guam Aquifer is called limestone. Limestone is mostly made up of fossilized coral and algae, which covers most of northern and central Guam. The southern boundary of the aquifer is the Pago Adelup fault line.



Over millions of years and after plate tectonic movements the island gradually uplifted from the sea, forming the limestone bedrock of the aquifer. Limestone is very porous and acts like a sponge. Rain water that falls onto the limestone infiltrates down into the limestone bedrock until it reaches sea level. Since seawater is denser then freshwater, the freshwater that infiltrates into the limestone bedrock floats on top of the heavier seawater. This forms a lens-shaped body of freshwater, called the Northern Guam Lens.


A spring bubbles up along the coast of Tumon Bay. Springs are places where water from the aquifer emerges and drains into the ocean.

Underneath the limestone that makes up the aquifer is a volcanic basement rock formation. Unlike the limestone, volcanic rock is very dense, and water can't flow through it very easily. In some areas of northern and central Guam this volcanic rock rises above sea level. In these areas infiltrating water flows over the volcanic rock until it reaches sea-level and becomes part of the water lens.

The Water Cycle

Did you know that northern Guam receives an average of 95 inches of rain per year? Of that, about 60% infiltrates into the water lens and recharges the aquifer. The rest of the water evaporates into the air or is taken up by plants. This process is called evapotranspiration. The water in the aquifer water lens flows at a very slow pace until it reaches the coastline. Once at the coastline the fresh water emerges from the shoreline in the form of seeps and springs and drains into the ocean. These seeps and springs are easily seen along Tumon Bay during low tides.

How much water can we produce?

Water from the aquifer is called groundwater.

continued on page 4

hat's Inside:

NLINE POLL QUESTION

uam's elected officials, which per- is working to protect our environ- t and why?

Send your answer to:
www.manlandsea@yahoo.com

st Liberation Day Parade Aluminum Recycling Contest

Collect & turn in the most aluminum cans at the drop off site at the parade.

Winner will have "first choice" of mp site along the parade route for iberation Day Parade 2007. Permit will also be waived.

For more information, please contact Peggy Denney at Guam EPA at 475-1654.

Office of the Governor of Guam
P.O. Box 2950 Hagåtña, Guam 96932
TEL: (671) 472-8931 • FAX: (671) 477-4826 • EMAIL: governor@mail.gov.gu

Message from the
Governor of Guam

Hafa Adai! We are blessed to call a tropical paradise our home. From lush jungles to bright coral reefs, Guam is a unique place that we all need to help protect.

This issue of Man Land and Sea has helpful tips about protecting our water sources and using pesticides safely - for our health and the health of the environment we rely on.

We all have a duty to do something to improve this beautiful island home that truly is the treasure of the Pacific. Together, we can make a difference for ourselves and our future.

I encourage everyone who calls Guam home to learn a little more about this special place and do your part to ensure that our island always is known as the tropical paradise community that everyone wants to be a part of.

Your children, and their children, will appreciate it.

Sinseru yan Magahet,

FELIX P. CAMACHO
I Maga' Låhen Guåhan
Governor of Guam

Message from the
Director, Bureau of Statistics and Plans

Hafa Adai! Water is essential for life. We use water for a variety of reasons such as drinking and bathing. Our rivers, bays, and oceans are our playgrounds and source of livelihood. We eat fish and other marine life from our waters. Clean water is our right. It is critical for human health as well as our ecosystem. The Guam Coastal Management Program strives to safeguard our island's water resources.

This issue of "Man, Land, and Sea" is dedicated to water. Read our newsletter to learn about our water resources and how we can play vital roles to protect our community's watersheds and coastal waters for future generations.

It's our island, and it's our future.

Si Yu'os Ma'ase.

ALBERTO A. LAMORENA V.
Acting Director

Man, Land & Sea Newsletter
Volume 1, Issue 2

Editor
Esther Gumataotao

Bureau Statistics & Plans
Alberto A. Lamorena V
Acting Director

Guam Coastal Management Program
Evangeline D. Lujan
Administrator

GCMP Staff
Raymond Caserez
Amalia De Leon
Terry M. Perez
Esther Gumataotao
Victor Torres
Timothy Samuda
Francis Damian
Nydia Llaneras

NOAA Pacific Islands Assistants
Dave Burdick
Romina King

Subscription Information
To subscribe to the Man, Land & Sea Newsletter please contact:
Evangeline Lujan
Man, Land & Sea Newsletter
Guam Coastal Management Program
Bureau of Statistics & Plans
PO Box 2950
Hagåtña, Guam 96932

Tel:
671.472.4201/2/3
Fax:
671.472.1812
E-mail:
vange@mail.gov.gu

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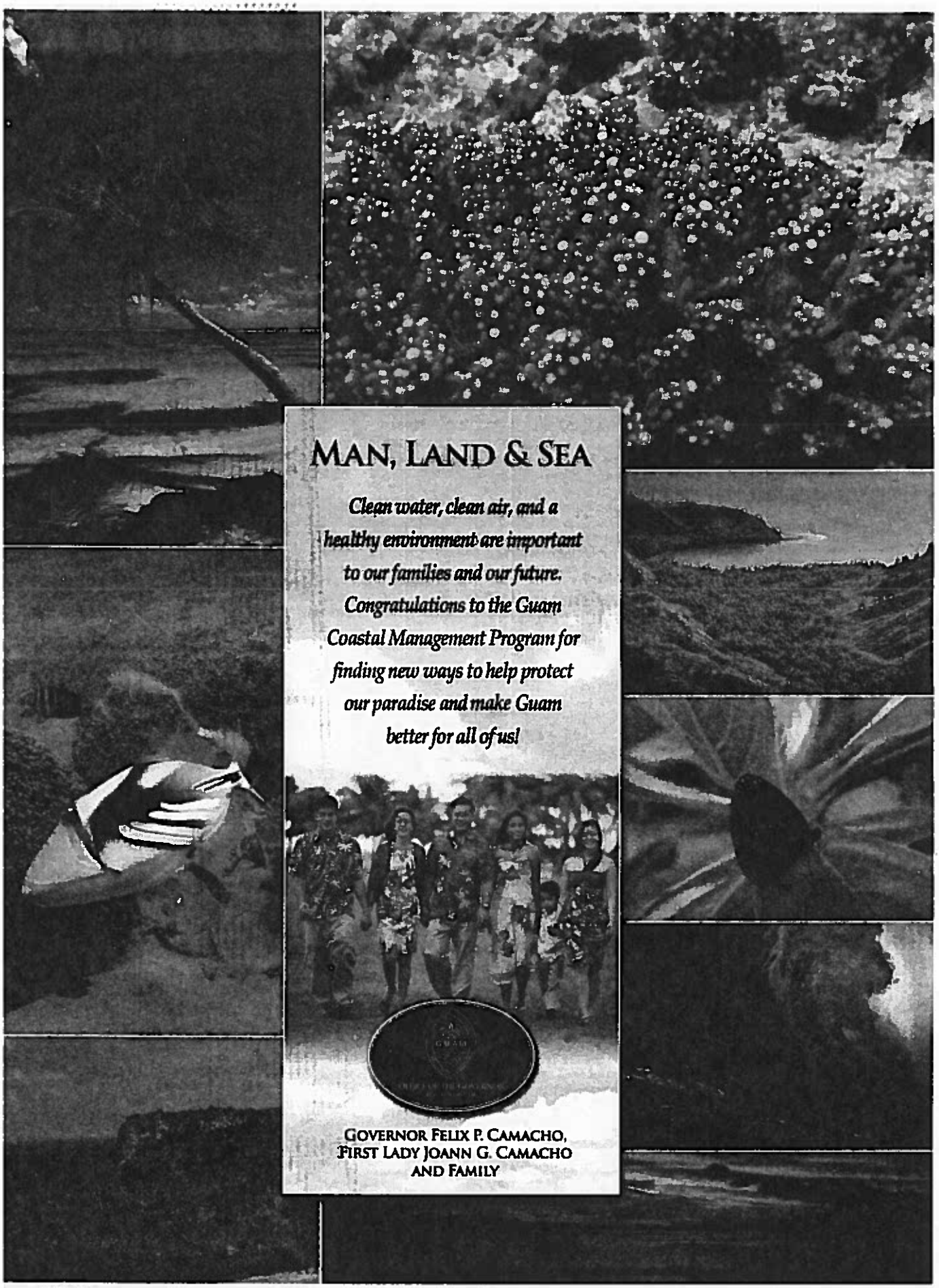


MAN, LAND & SEA

Clean water, clean air, and a healthy environment are important to our families and our future. Congratulations to the Guam Coastal Management Program for finding new ways to help protect our paradise and make Guam better for all of us!

GOVERNOR FELIX P. CAMACHO,
FIRST LADY JOANN G. CAMACHO
AND FAMILY

Consumer tips:

Wash your food with clean water before cooking or eating.
Peel fruits and vegetables, if possible.

Trim fat from meats, as some pesticide residues may collect in animal fat.
Eat a varied diet rich in fruits and vegetables. Different pesticides are used for different crops, so eating a varied diet helps [illegible] of one chemical.

Tips for growers and producers:

Use only U.S. EPA-registered pesticides.
Read labels carefully before use and follow label directions.
Never use pesticides labeled for non-agricultural uses on crops. Use pesticides for crops, sites, and timelines listed on the label.
Wear appropriate personal protective gear.
Store and dispose of pesticides and containers according to label directions.

For more information:
For information about pesticide importation, contact Customs and Quarantine at 475-6202.
For questions about residue sampling, call Public Health at 735-7221.
Farmers may call the Department of Agriculture at 734-3945.
For general information about pesticide regulation, call Guam EPA at 475-1658.

Source: [illegible] for [illegible] Cancer and Environmental Risk Factors, Guam EPA, U.S. EPA Region IX.

Pesticides and your Produce

Vegetables are supposed to be good for you - but fears about local pesticide use may be causing unnecessary alarm about healthy, safe foods in Guam markets.

"Our concern at this point is there is really some confusion - is it safe to eat vegetables at all on Guam?" said Betwin Alokoa, Program Manager for the Guam Environmental Protection Agency's Pesticide Program.

"If you wash your vegetables thoroughly and handle them properly, we believe it's safe," Alokoa said, noting that consumers should carefully wash all vegetables, whether they are from Guam or other sources.

Alokoa stressed that not all farmers are illegally using pesticides, which are an important tool to help control the wide range of pests that plague local growers. He said many local growers are not abusing pesticides, and the local government is working with farmers and other pesticide users to ensure that pesticides are handled safely.

Pesticides are designed to kill or adversely affect insects, fungus, and other living things considered to be "pests." While some of the chemicals may cause illness or are suspected to cause cancer, it is often unclear exactly how a chemical will affect human health. This uncertainty has led local and federal authorities to monitor and regulate pesticide use and exposure.

Alokoa said Guam EPA has good partnerships with the University of Guam, which offers pesticide training programs, the Department of Agriculture, the Customs and Quarantine Agency, and the Department of Public Health and Social Services. Together, these agencies work together to educate the public about safe pesticide handling, permit and import requirements for these chemicals, and other issues regarding pesticide use on Guam.

"We'd prefer chemicals as the last resort. But a lot of these farmers prefer using chemicals first," said Guam EPA Environmental Specialist Karl Olson. "What we try to do is go out and talk to the farmers." Proper pesticide handling, as well as other Integrated Pest Management (IPM) practices, are taught in the Core Class at the University of Guam.

Corrections Officer J.C. San Nicolas smells freshly-picked sweet basil from the Organic Demonstration Farm in Mangilao. The farm is organized by the Department of Agriculture and through a memorandum of understanding the Department of Corrections supplies the labor for the farm.

Olson and Alokoa conduct inspections and monitor pesticide use for Guam EPA, and under certain partnerships with the U.S. Environmental Protection Agency, which has additional regulatory responsibility for pesticide use. Olson said the agency used to focus on "restricted use pesticides," but will be working to monitor general use pesticides as well because of recent indications of abuse of these substances.

UOG and the Department of Agriculture also are working to promote integrated pest management practices - a suite of tools that doesn't rely solely on chemicals for pest control. Olson said farmers have found it difficult to make the switch to organic farming, but there are a range of ways to control pests. On Guam, it takes up to 5 years to become a certified Organic Farmer.

Sometimes, Olson said, problems occur because of a lack of understanding about the chemicals and their effects on specific pests. A farmer might load his crops with fungicide in an effort to control white flies, he said, but the flies remain a problem because they are not affected by that specific chemical.

Alokoa said he is hopeful that the renewed focus on pesticide use will allow Guam EPA and other agencies to work more closely with farmers and promote better, safer pesticide practices.

WATER FACTS

- Of all the earth's water, 97 percent is salt water.
- Two percent of the water on our planet is frozen and one percent of the earth's water is available for drinking. If all the world's water were fit into a gallon jug, the fresh water available for us to use would equal only about one tablespoon.
- Almost two thirds of the human body is water. Your skin is 70 percent water.
- Public water suppliers in the U.S. process 38 billion gallons of water per day for domestic and public use. The United States consumes water at twice the rate of other industrialized nations.
- Households typically use about 30 percent of their water for outdoor use including watering lawns and gardens. Toilets use the most indoor water with an average of 27 gallons per person every day.
- You can survive about a month with no food but only five to seven days without water.
- Most of the world's people must walk at least 3 hours to fetch water.
- An average five-minute shower uses between 15 to 25 gallons of water.

Source: [illegible]

aquifer

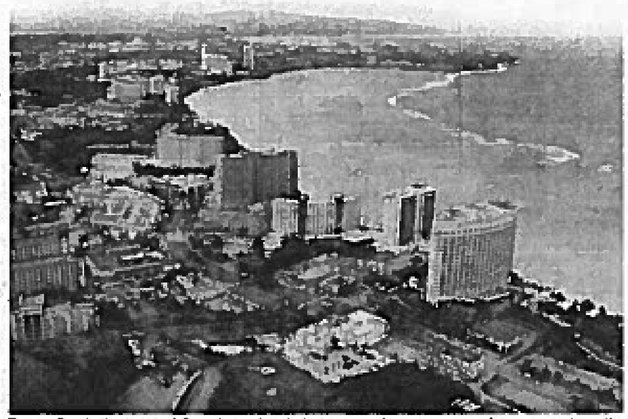
continued from page 1

The Guam Waterworks Authority is in charge of getting water from the aquifer and delivering it to your house. They do this by drilling deep wells into the limestone bedrock and pumping the water up to the surface using electrical pumps. They then treat the water with chlorine before is gets delivered to customers through underground pipes. An average GWA well produces about 200 gallons of water per minute, but some wells produce even more water. There are more than 110 water wells throughout Northern Guam that provide water to the villages. Some private companies own and operate water wells and produce groundwater for their own needs.

A few studies have been done to estimate the amount of groundwater that can be produced without damaging the aquifer. This information is extremely important because the aquifer can easily be over pumped. When you take too much freshwater too quickly, the saltwater underneath can be drawn into the freshwater, contaminating it. This process is called saltwater intrusion. It has been estimated that about 60-80 million gallons per day can be produced from the aquifer without harming it. Current water production in the Northern Guam aquifer is between 30-35 million gallons per day. However, different areas of the aquifer will yield different amounts of groundwater. In some areas of Hagåtña and Mangilao, there are signs that too much water is being pumped and that salt water is making its way into the pump.

How can we protect the aquifer for the future?

Protecting the aquifer from saltwater intrusion has fairly simple solutions: reduce the pumping rate of the well, stop using the well, or adjust the well intake to take water from higher in the water column.



Tumon Bay is the heart of Guam's tourism industry, a marine preserve, and one area where the Northern Guam Lens aquifer drains into the ocean.

The aquifer also needs to be protected from different threats, such as contamination from activities that occur above the aquifer. Oil and chemicals from road runoff, excessive pesticide and fertilizer use and improper disposal of chemicals are just some of the ways the aquifer can be contaminated. Once pollutants get into the aquifer, it can take many years for the aquifer to cleanse itself. Sometimes, we can try to remove pollutants, but this process is expensive and time consuming.

Protecting the aquifer from pollution takes public education and participation. Dispose of used oil and house hold chemicals properly. Report any illegal dumping and just being environmentally conscious can help protect our water resources for us and for future generations.

"Our Coasts. Our Future."

Organic farming

By Tammy Anderson

Corrections Officer J.C. San Nicolas stands in a small area of Mongo Beans planted at the Organic Demonstration Farm in Mangilao. The beans will be tilled and used as fertilizer to enrich the soil with natural nutrients for crops in the future.

Most people don't associate the word "beneficial" with beetles, flies and other pesky insects. But those bugs and their friends have a special home at a five-acre plot in Mangilao.

The beneficial bug paradise is part of a project known as the Organic Demonstration Farm run by the Department of Agriculture. The farm debuted in 2004 by with a test two acres near the main DOA office. It has developed into a five-acre plot that boasts everything from blooming marigolds, small calamansi trees, fresh mint to large eggplants.

There is one thing that sets all of the plants and trees grown at the farm apart from others on island, according to Paul Bassler, director of the Department of Agriculture. Everything at the Demonstration Farm is grown organically.

"Organic farming is utilizing the natural process rather than supplementing it," Bassler said. "You use natural materials for pest management ... soil conditioning ... for everything."

The organic processes at the farm include using marigolds and beneficial bugs as pesticides instead of man-made chemicals. Certain types of grass are grown in contoured lines to slow soil erosion. Organic mulch, or grass clippings, and certain types of plants are used to restore nutrients to the ground instead of man-made fertilizers.

Synthetic fertilizers typically contain only main elements, for example nitrogen, Bassler explained. Using natural fertilizers restores main elements like nitrogen and replaces trace elements that man-made fertilizers do not have, he said.

"Organic farming is all about feeding the soil with natural nutrients. You are building the fertility of the soil as you go rather than reducing it," Bassler said.

Farming organically not only builds the fertility of the soil, it also reduces the number of toxins that end up in the ground and eventually in Guam's water sources.

Synthetic chemicals are used for fertilizer and pesticides. Those man-made toxins may wash off the plants and leak into the ground. Eventually, the chemicals move through Guam's fertile soil toward water.

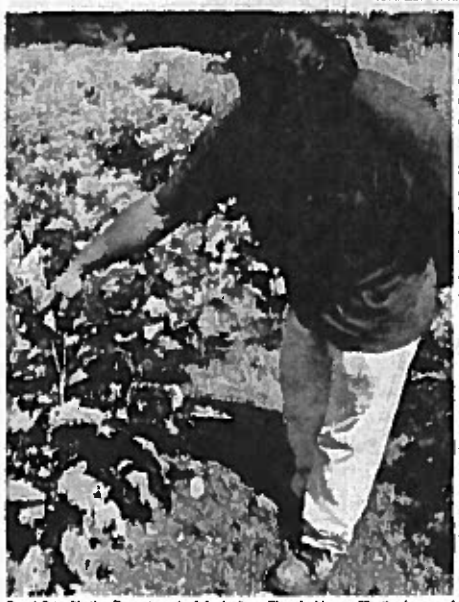
"Let's face it. These synthetic materials do have toxins. (With organic farming), you can stop unwanted toxins from getting into the rivers which eventually make it down to our coral reefs," Bassler said.

"I am hoping that mankind in general recognizes the importance of going through nature's process than believing that we ... can come up with a better process," Bassler said.

Even if you are not a farmer by trade, you can take part of the organic process. Bassler said he started his own organic garden when he was 18. To this day, he continues to cultivate crops without using any man-made chemicals.

"I would suggest everybody do some organic growing," Bassler said. If more residents grew fruits, vegetables and herbs as a hobby, Guam's dependency on imports would decrease, Bassler said. Plus, fruits and vegetables that are toxin-free are healthier to eat and in some cases, easier on your pocket book.

"You can do small plots or just a few potted plants," Bassler said. "As far as money out of your pocket, you can practically grow things for nothing."



Specialist with the Department of Agriculture Ricardo Lizama lifts the leaves of an organically-grown eggplant displaying a dark, fully-grown Black Beauty eggplant at the Organic Demonstration Farm in Mangilao.

Ricardo Lizama, a specialist with the Department of Agriculture, stands with young Calamansi trees being grown at the Organic Demonstration Farm in Mangilao. The farm uses organic methods to grow fruit trees, herbs and other plants.

Organic Recipes

Although there is no place to buy fresh organic produce on Guam, many organic dishes can be prepared using fresh, organically grown vegetables from your own garden.

SUMMER LASAGNA - Serves eight

1 tablespoon of olive or coconut oil
2 to 4 cloves or minced or pressed garlic
1 medium onion, chopped
2 summer squash or zucchini
1 tablespoon of fresh basil or 1 teaspoon if it is dried
1 quart of tomato sauce
9 lasagna noodles
1 bunch of kale or other cooking greens
1 1/2 cup of cottage or Ricotta cheese
1 beaten egg white
1/4 teaspoon of sea salt
Freshly ground black pepper
1/2 pound of grated Mozzarella
1/2 cup of grated Parmesan cheese

1. Heat oil in large saucepan or deep skillet over medium heat and sauté garlic, onion, and zucchini until just barely tender.
2. Stir in basil and pasta sauce and allow to simmer over low heat while you prepare the rest of the lasagna.
3. Cook lasagna noodles in boiling water until just barely tender. Drain and rinse with cold water. You can lay the noodles on the clean counter so they won't stick together.
4. Wash kale or cooking greens well. Trim the tough stems and steam or boil whole leaves until they are just tender.
5. Drain leaves well, squeeze out excess water, and chop.
6. Mix cottage or Ricotta cheese and egg white together thoroughly. Season with salt and pepper. Blend in the greens. Preheat oven to 350 degrees.
7. Place 1/4 cup of the sauce in the bottom of a 9 x 13-inch baking pan. Line the bottom of the pan with 3 of the cooked Lasagna noodles. Spread half of the cottage or Ricotta cheese mixture on top of the noodles. Cover this with half of the Mozzarella. Top this with a third of the sauce, spreading as evenly as possible.
8. Repeat with three more noodles, the remaining cottage or Ricotta cheese, the remaining Mozzarella, approximately half of the sauce you have left, and cover all this with the last three noodles. You should have just enough sauce to cover the top of the noodles.
9. Sprinkle with Parmesan cheese. Cover pan with foil and bake for 40 minutes. Remove foil and bake another 10 to 15 minutes, uncovered. Remove from oven and allow to sit several minutes before serving.

HOT AND SOUR CABBAGE SALAD

1 pound of thinly shredded or sliced cabbage
1/4 cup rice vinegar
4 baby leeks or green onions, thinly sliced
1 tablespoon minced peeled fresh ginger
1 teaspoon sugar
1/2 to 3/4 teaspoon dried hot red pepper flakes or crushed boonie peppers
1. Put cabbage and onions or leeks into a large bowl.
2. Bring vinegar, ginger, sugar and red pepper flakes to a boil in a small saucepan over moderate heat. Stir the mixture until the sugar is dissolved.
3. Pour hot dressing over the cabbage and toss the salad.

SOURCE: Seabreeze Organic Farm/Organic Valley

Marine Debris Spotlight

The Scourge of Guam's Shores

By: Val Brown

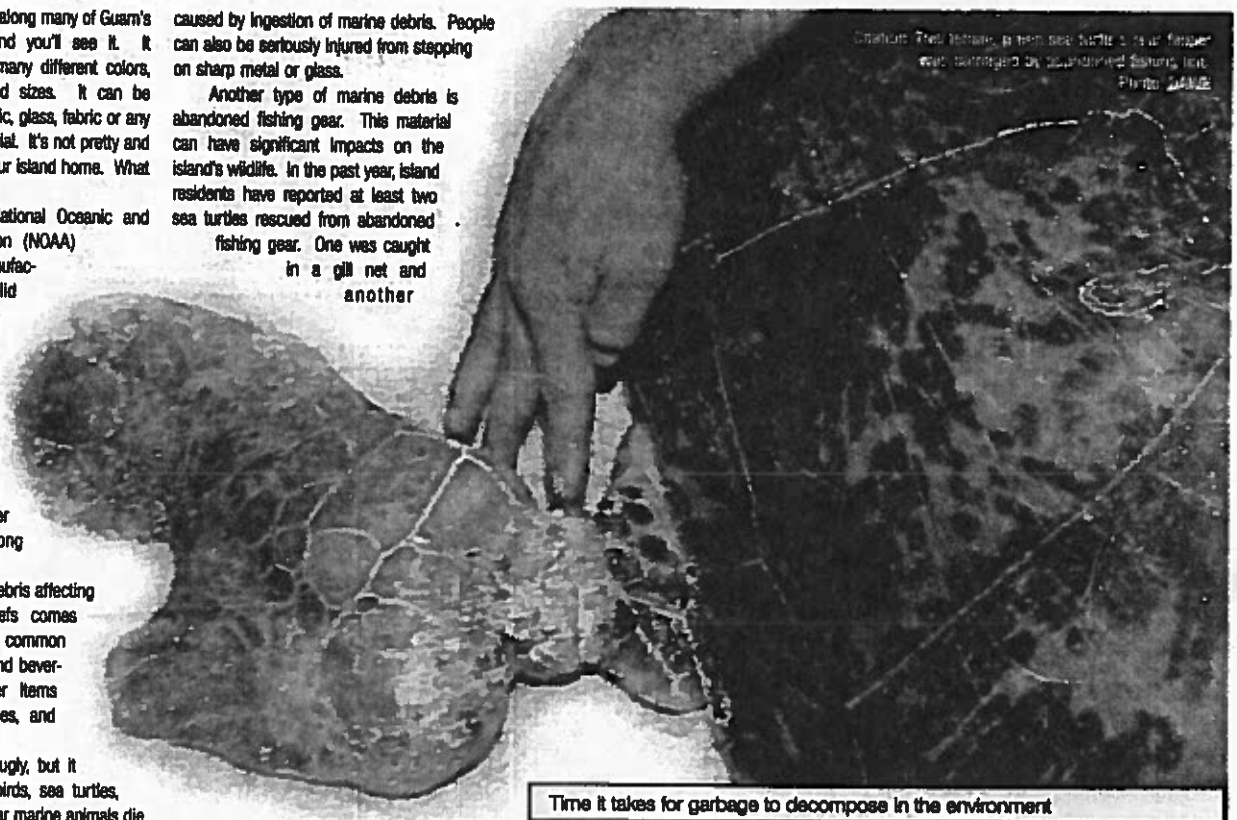
Take a walk along many of Guam's beaches and you'll see it. It comes in many different colors, shapes, and sizes. It can be wood, plastic, glass, fabric or any other material. It's not pretty and it tarnishes the image of our island home. What is it? Marine debris.

According to the National Oceanic and Atmospheric Administration (NOAA) marine debris is any manufactured or man-made solid material that enters the coastal or marine environment. It may enter directly when it is lost or dumped from a ship or indirectly when debris washes out to sea via rivers, streams, and storm drains. It also includes litter left on beaches or along streams.

Much of the marine debris affecting Guam's beaches and reefs comes from littering. The most common items are cigarette butts and beverage containers, but other items include appliances, batteries, and car parts.

Litter not only looks ugly, but it also can impact fish, seabirds, sea turtles, and even people. Every year marine animals die after becoming entangled in marine debris or eating debris such as lighters and glow sticks. Staff at the Department of Agriculture's Division of Aquatic and Wildlife Resources (DAWR) have documented a number of sea turtle deaths caused by ingestion of marine debris. People can also be seriously injured from stepping on sharp metal or glass.

Another type of marine debris is abandoned fishing gear. This material can have significant impacts on the island's wildlife. In the past year, island residents have reported at least two sea turtles rescued from abandoned fishing gear. One was caught in a gill net and another was ensnared by a wire fishing leader that had become entangled in a coral head.



Monofilament gill nets are one of the most deadly marine debris items found in Guam. These nets are nearly invisible in the water and almost impossible to break. They can continue to catch fish, turtles, and marine mammals for many years after they are abandoned. In 2003, over 100 nets were collected during the International Coastal Cleanup sponsored by the Guam Coastal Management Program, and DAWR staff collected an additional 35 nets off of the reef. DAWR has found coral, dead fish, and dead crabs entangled within abandoned gill nets.

Val Brown is a Coral Reef Ecologist at the Department of Agriculture, Division of Aquatic and Wildlife Resources and can be reached at valerie.brown@noaa.gov for more information on marine debris.

You can help protect Guam's beaches and wildlife:

* Dispose of trash properly.
* Reduce, Reuse, and Recycle.
* Use reusable cloth bags when you go shopping.
* Participate in local cleanups like Na La Bonita and the International Coastal Cleanup.
* Never leave nets or other fishing gear in the water or on the beach.

If you do see abandoned nets, please contact DAWR at 735-3955/56

Time it takes for garbage to decompose in the environment	
Glass bottles	1 million years
Monofilament fishing line	600 years
Plastic beverage bottles	450 years
Disposable diapers	450 years
Aluminum can	80 - 200 years
Foamed plastic buoy	80 years
Rubber boot sole	50 - 80 years
Foamed plastic cup	50 years
Tin can	50 years
Leather	50 years
Nylon fabric	30 - 40 years
Plastic film canister	20 - 30 years
Plastic bag	10 - 20 years
Cigarette filter	1 - 5 years
Wool sock	1 - 5 years
Plywood	1 - 3 years
Waxed milk carton	3 months
Apple core	2 months
Newspaper	6 weeks
Orange or banana peel	2 - 5 weeks
Paper towel	2 - 4 weeks

Information source: US National Park Service; Mote Marine Lab, Sarasota, FL.

The University of Guam Marine Laboratory announces the release of the

Guam Coastal Atlas

By Dave Burdick

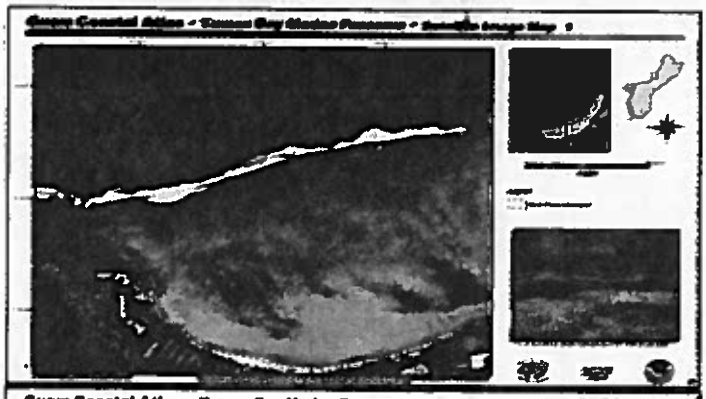
The University of Guam Marine Laboratory is announcing the release of the Guam Coastal Atlas, a new product that provides satellite imagery, benthic habitat data, marine preserve boundaries, and other coastal information to Guam's coastal resource managers, researchers, students, fishermen, recreational users, and the general public.

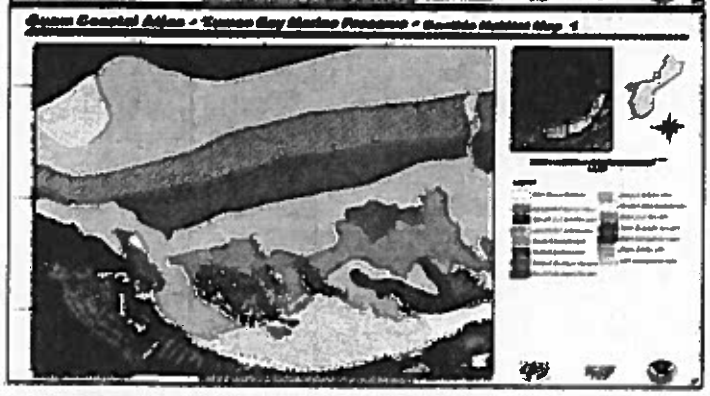
The Guam Coastal Atlas is comprised of a series of maps that provide satellite imagery and benthic habitat data for the length of Guam's coastline (see images below). Colorful photographs of Guam's reefs, beaches, and bays are also included in the atlas. More detailed maps are provided for four of Guam's marine preserves and three "focus areas." The preserves, including the Tumon Bay, Pitl Bomb Holes, Sasa Bay, and Achang Reef Flat, as well as Cocos Lagoon, East Agana Bay, and Pago Bay, were chosen for more detailed mapping because of their particular importance to managers, researchers, fishermen, and recreational users.

The atlas also contains a "Spatial Data Library" section, which provides descriptions and sample images for several of the spatial data sets available for Guam. Some of the data highlighted in the atlas include elevation data, bathymetry (ocean depth) data, and streets, vegetation, soils, and geology data.

The satellite images used in the atlas were collected from a satellite orbiting more than 400 miles above earth's surface. A sensor onboard the satellite, known as the IKONOS sensor, can capture images of the earth's surface with amazing detail. You can see streets, buildings, and even cars in the satellite images! In clear, tropical water, such as in the waters around Guam, even the ocean bottom as deep as 100 feet can be seen! Besides providing striking scenes of Guam's coastal areas, this satellite imagery was also used with Geographic Information System software to create the benthic habitat data presented in the atlas.

Geographic Information Systems? Benthic habitat data? So what do these terms mean, you may ask? Well, a Geographic Information System - or GIS for short - is essentially a computer-based mapping system. Benthic habitat data tell us what is covering the ocean floor, what kind of structures occur on ocean floor in a particular area (e.g., sand, rock, reef, etc.), and what kind of organisms live on the surface of those structures (e.g., seagrass, algae, coral, etc.).





When looking at a satellite image, one can easily see seagrass beds, sandy areas, and reefs. With a GIS you can create a digital representation of each seagrass bed, sand patch, or section of reef by "drawing" over the satellite image on the computer screen. However, determining how much of a given area on the ocean floor is covered by each of the various types of organisms present (e.g., 10% - 50% sea grass, 50% - 90% coral, etc.) by simply looking at the satellite image is often quite difficult or even impossible. In order to help determine these fine-scale details and improve the overall accuracy of the benthic habitat data, additional data, called "ground-truthing" data, were collected out in the shallow waters around Guam with a hand-held Global Positioning System (GPS) receiver (see photo below). The GPS receiver allows you to determine your exact position on the earth's surface, and when used out in the water, it allows you to record the position and descriptive information for the benthic habitat features you may come across. You can then compare what was interpreted from the satellite imagery with what was collected out in the water with the GPS receiver and make any necessary adjustments. The ground-truthing data also help to train the data creator's eye to recognize certain benthic habitat features according to their color, shape, and texture in the satellite imagery.

The benthic habitat data used in the Guam Coastal Atlas were not created entirely from scratch by the University of Guam Marine Laboratory, but rather were an update to data developed by NOAA's Biogeography team for their February 2005 publication, Atlas of the Shallow-Water Benthic Habitats of American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands. In order to update the benthic habitat data developed by the NOAA Biogeography Team and improve the data's level of detail, more recent satellite images were used and additional ground truthing data were collected.

The Guam Coastal Atlas was developed by David Burdick, the 2004-2006 NOAA Pacific Islands Assistant for Guam, under the supervision of Dr. Terry Donaldson, the Principle Investigator, and Barry D. Smith, Director of the University of Guam Marine Laboratory. The project was funded by the U.S. Department of Interior and NOAA through Coral Reef Initiative grant number CRI-GU-00. Only a very limited number of printed atlases were made available, but an interactive CD-ROM product and a web site (http://www.uog.edu/marinelab/coastalatlas) will be available in June 2006. For more information, or to obtain a copy of the atlas, please visit the University of Guam Marine Laboratory web site at http://www.uog.edu/marinelab or inquire by phone at 735-2175.

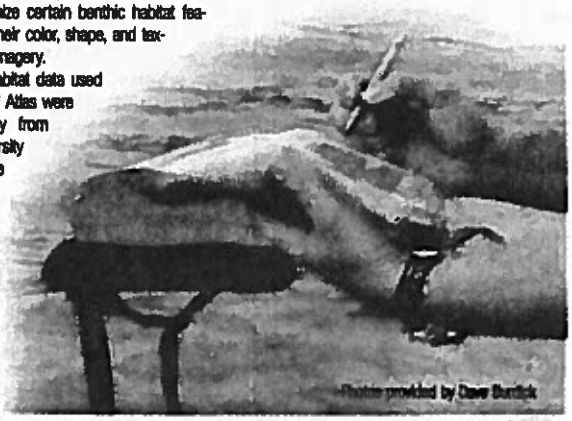


Photo provided by Dave Burdick

"Our Coasts. Our Future."

What In The World Is This?

Family: Hydrocharitaceae
Genus: Hydrilla
Species: verticillata
Common Name: Water Weed
Original distribution: Southern India

Source: Department of Agriculture, DAWR

What is invasive species?

According to the United States Department of Agriculture "alien species" means, with respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem. "Invasive species" means, an alien species whose introduction does or is likely to cause economic or environmental harm, or harm to human health.

Hydrilla verticillata commonly known as the Water Weed is an invasive aquatic plant on Guam. Hydrilla is very adaptive, which can grow in almost any freshwater system. It can live in low light to 1% of full sunlight, and tolerate up to 7% salinity, with a high or low nutrient content. Its temperature range is limited to between 20 and 27° C. Water weeds can reproduce vegetatively or sexually.

Consequently, the weed's rapid growth generates harmful impacts to Guam's environment and the economy. Water weeds crowd out native vegetation and renders aquatic habitats unsuitable for native aquatic fauna. Moreover, this plant is a major cause of clogs at the Ugum water treatment plant. Several hours are spent almost every week to physically remove plants from pump intakes, which create losses in personnel time and increases operational costs for Guam's water agency.

Introduction to Guam: Hydrilla is often kept as an aquarium plant, and may have been introduced by the emptying of aquarium contents into a local water source. It is also often shipped accidentally as a contaminant with freshwater fish for pet trade or for the aquaculture industry.

Methods of Control: Herbicides can be used, but their effectiveness is limited. Grass carp have been introduced for biological control, in some areas with success. Tilapia (*Oreochromis mossambicus*) was introduced to Guam in part to control Hydrilla population; however, this method has been unsuccessful.

WATER CONSERVATION TIPS

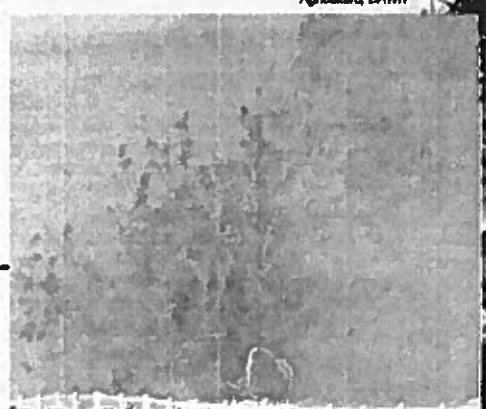
IN THE HOUSE

- Only run the washing machine when it is fully loaded.
- Use two basins of water to wash dishes instead of running the water for rinsing.
- Use a broom instead of a hose to clean sidewalks or driveways.
- Repair dripping faucets and leaking toilets. Dripping faucets can waste about 2,000 gallons of water each year. Leaking toilets can waste as much as 200 gallons each day.
- Install water-saving faucets and showerheads. You can also buy low-flush toilets. Conventional toilets use 3.5 to 5 gallons or more of water per flush, but low-flush toilets use only 1.6 gallons of water or less.
- Take shorter showers. A one to two minute reduction in shower time can save up to 700 gallons of water every month.
- Turn the water off while you brush your teeth.
- Put a plastic bottle or bag weighted with pebbles and filled with water in your toilet tank. Displacing water allows you to use less water each flush and could save five to 10 gallons a day.

OUTSIDE

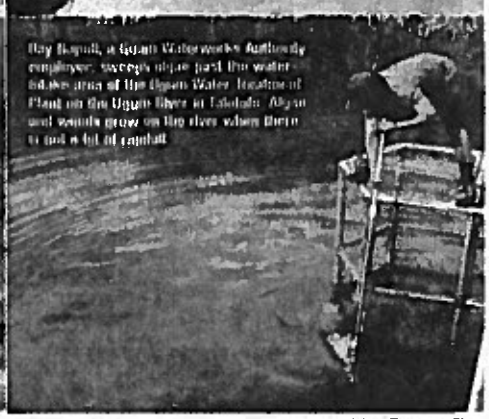
- Don't over-water your lawn or garden. To prevent water loss from evaporation, water your lawn or garden during the coolest part of the day.
- Don't run the hose to wash your car. Use a bucket of water and a quick hose rinse at the end.
- Use layers of mulch around trees and plants to slow evaporation.

Source: US Environmental Protection Agency/American Water Works Association



TOP LEFT: Hydrilla verticillata, commonly known as water weed, grows in the Ugum river near intake area for the water-treatment plant. Guam Waterworks Authority workers cut this weed every few months to keep it from spreading.

BOTTOM LEFT: Ray Naputi looks into the pump that brings water from the Ugum river to the nearby water treatment plant. Naputi works at the Guam Waterworks Authority at the southern plant near the village of Talofofo.



Pictures taken by Tammy Andersen at the Ugum Water Treatment Plant

Kika's Kid Page

ne Water Cycle

ou ever thought about where the water you are drinking came from? Sure it may
llen from the sky as rain, but there is a process: The Water Cycle - it keeps going
l and around. Here is how it works.

ater cycle is made up of several main parts:
. Evaporation (and transpiration)
. Condensation
. Precipitation
. Collection

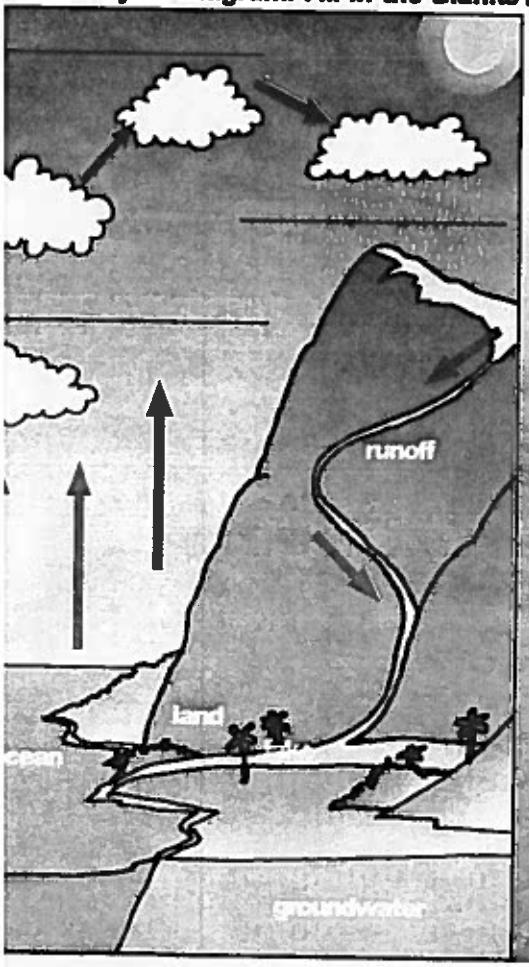
ration (and transpiration): The sun heats up water in rivers, lakes, oceans, plants,
es and transforms it into a vapor or steam. This water vapor or steam rises into the
nilar to how people perspire (sweat), plants transpire. Transpiration is the process by
lants lose water out of their leaves.

nsation: As the water vapor in the air gets cold, it changes back into liquid forming

itation: happens when so much water has condensed that the air cannot hold it
e. The clouds become heavy and water is immediately returned to the earth in the
rain, hail, sleet, or snow. On Guam, water falls back to the earth as rain.

tion: Rain and melted snow is brought back to the oceans by rivers, streams, and
from glaciers and water underground. When water ends up on land, it will either soak
earth and become part of the "ground water" that plants and animals use to drink
y run over the soil and collect in the oceans, lakes, or rivers where the cycle starts
again.

Water Cycle Diagram. Fill in the Blanks



Aliciana Tainatongo from Dededo asks Kika:

Why is the water at the beach salty?

Kika: The reason seawater is salty might seem a little strange to you at first - it came from rocks on land! The process works like this: rain contains some carbon dioxide that came from the surrounding air. This makes the rain a little bit acidic. When rain falls on rocks, it erodes them and the acid breaks down the rocks and the minerals they contain. As the water travels it carries these bits as dissolved salts into streams, rivers, and eventually the ocean.

Since rain falls all the time and you don't often see rocks melting away, you're probably wondering how this caused enough minerals (salts) to get into the ocean to make it salty. Well, this happened over a long time - a very, very, very long time. And unlike streams and rivers, the oceans don't drain to somewhere else. As water evaporates off the top of the ocean, it leaves the salts behind. Scientists think the whole process has taken hundreds of millions of years to bring the salt content of the ocean to its present level.

Another source of dissolved salts lies on the ocean floor. Hydrothermal vents are places where sea water has seeped into the rocks of the ocean's crust and gotten hotter, dissolving some minerals from the crust. As this hot water flows back into the ocean, it carries dissolved minerals - more salts!

The two most common dissolved salts in seawater are sodium and chloride, the same things that make up the table salt you might use at home to cook with. The concentration of salt in seawater is about 35 parts per thousand. If you took all the salt out of seawater, some people estimate that you could make a layer 500-feet thick, or about the height of a 40-story building, over all the land on earth.

Source: USGS [illegible]

Do you have a question for Kika?

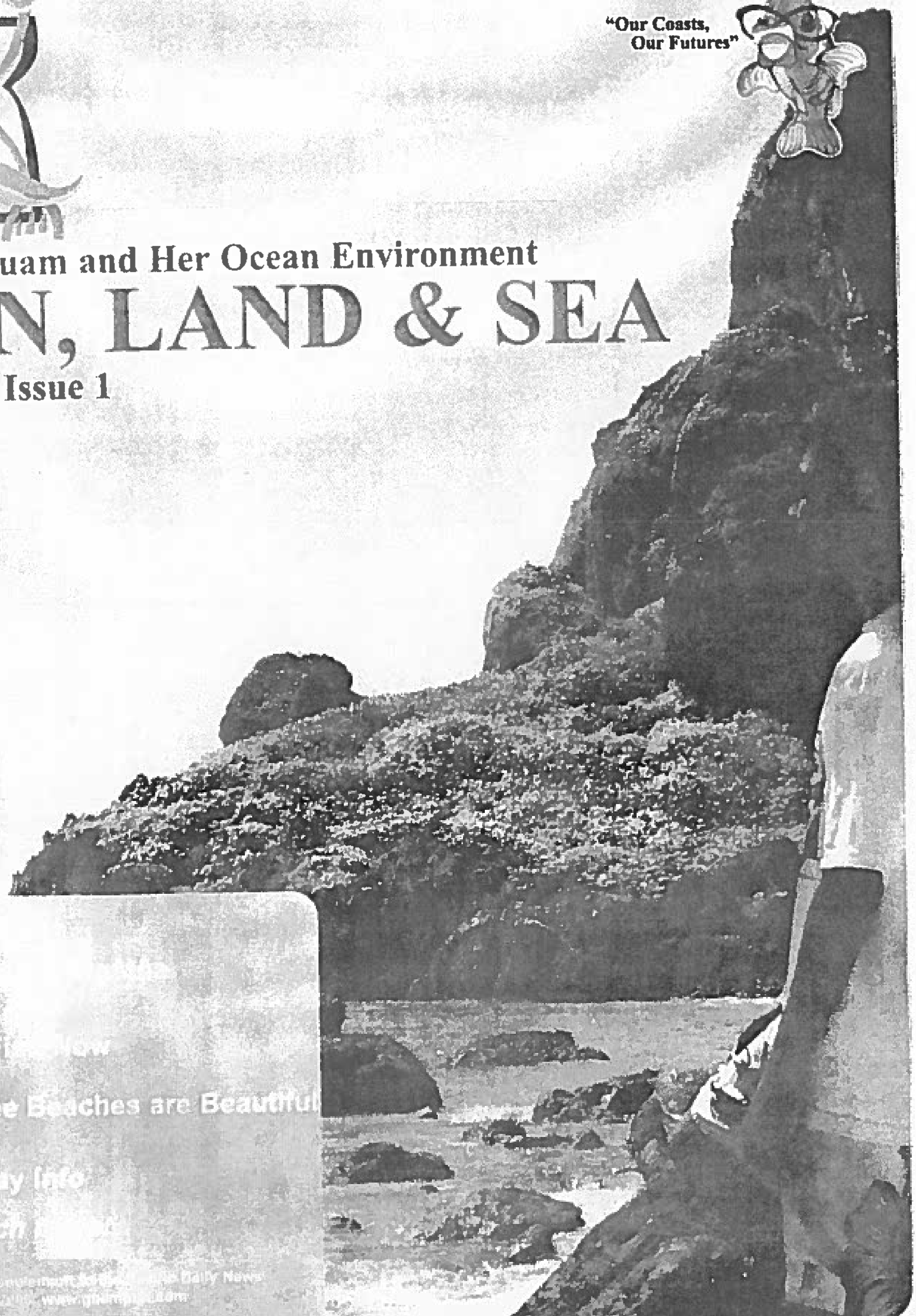
If you want to ask a question about Guam's environment, write to Man Land and Sea newsletter, Guam Coastal Management Program, P. O. Box 2950, Hagatña, Guam 96932 or fax questions to (671) 477-1812 or email: www.manlandsea@yahoo.com. We'll try to answer as many questions as we can fit in the space provided.

Thanks for helping us let everybody know some neat things about our island home!

News of Guam and Her Ocean Environment

MAN, LAND & SEA

Volume 1, Issue 1



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Tony Lamorena

Hafa Adai

and welcome to the new and distinct format of the "Man, Land and Sea" news. For the past 17 years, "Man, Land, and Sea" has provided its readers information on Guam and her ocean environment. However, this new approach will provide a larger circulation to our community informing you, our readers the latest news updates on what's happening with our environment on Guam and the region.

The preservation of our island resources is of importance to all who call Guam their home. The demands and strain on our ecosystem are tremendous in today's society. Our readers will be able to be kept abreast of what the various agencies and entities are doing to improve and maintain the quality of life for the people of Guam. However, our resources are sometimes misused, many times unintentionally. Regardless, these actions and behaviors have a detrimental impact on the health of our island environment.

In this issue we introduce the Guam Coastal Management Program, our network partners, and our efforts to protect Guam's natural resources. In future issues we will be covering topics related towards the need to preserve our natural resources such as our coral reefs, marine life, water, air and land, and how you, our readers can make yourselves aware of what you can do to help in preserving and maintaining these vital resources.

Living in paradise has its responsibilities and we all need to contribute towards maintaining our natural resources. We hope you will enjoy this inaugural issue and we ask you to make comments on how we can better improve our newsletter to better serve our community's needs. Send your comments to Evangeline Lujan, Administrator at vange@mail.gov.gu or call 472-4201.

GCMP HISTORY

In 1972, the United States Congress declared that the coasts of the United States were in jeopardy because of development, pollution, and an increased shift of population centers toward the coastline. In response, the Coastal Zone Management Act (CZMA) of 1972 was enacted into law. This act offered the coastal states and territories opportunity to develop programs which would be federally funded, but locally developed and administered, to help protect the fragile coastal areas.

In 1975, the Government of Guam applied to be a part of this national program. The Governor approved a request for matching funds to begin the planning phase and federal funds were allocated for Guam's Coastal Management Program. The National Oceanic and Atmospheric Administration (NOAA), under the U.S. Department of Commerce awarded its Certificate of Approval on September 1979 for the implementation of the Guam Coastal Management Program (GCMP).

One of the most significant aspects of the GCMP distinguishing it from most of the thirty-four (34) other State or territorial programs, is its broad scope. Rather than designating a distinct "Coastal Zone" through delineation or an inland boundary by distance (e.g., 1000 yards in California) or by geographical features (to the crest of the coastal mountain range in Oregon), the entire island, including the surrounding sea out to 3 miles, was included under the jurisdiction of the GCMP. The word "zone" is deleted in referring to Guam Coastal Management Program, avoiding suggestion of its applicability to a narrower shoreline strip or fringe area. Because the entire island has been designated a "coastal zone" in the context of the CZM Act, the GCMP applies island-wide.
Therefore, all Guam's land and sea areas and all its land-use related planning and regulatory agencies, environmental programs, and laws fall within the concern of the Guam Coastal Management Program.

Man, Land & Sea Newsletter
Volume 1, Issue 1

Editor
Esther Gumataotao

Bureau Statistics & Plans
Alberto A. Lamorena V
Acting Director

Guam Coastal Management Program
Evangeline D. Lujan
Administrator

GCMP Staff
Raymond Caserez, Amelia De Leon, Terry M. Perez, Esther Gumataotao, Victor Torres, Timothy Semuda, Francis Damian

NOAA Pacific Islands Assistants
Dave Burdick
Romina King

Subscription Information
To subscribe to the Man, Land & Sea Newsletter please contact:
Evangeline Lujan
Man, Land & Sea Newsletter
Guam Coastal Management Program
Bureau of Statistics & Plans
PO Box 2950
Hagatña, Guam 96932

Tel:
671.472.4201/2/3
Fax:
671.472.1812
E-mail:
vange@mail.gov.gu

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GCMP:

Preserving Guam's Natural Resources

By Esther Gumataotao

The Guam Coastal Management Program (GCMP) works in partnerships with both the local and federal governments to manage Guam's coastal resources. We also work in partnership with Guam's local community to protect, conserve, restore, and enhance our island's natural resources by ensuring the balance between economic development and environmentally prudent uses of our coastal zone for Guam's people.

While the core of the GCMP exists as a division of the Bureau of Statistics and Plans, a number of other Government of Guam departments and agencies play an integral part in the program. Department of Land Management, Public Works, Parks and Recreation, Agriculture, and Guam Environmental Protection Agency, all constitute the regulatory and enforcement functions of the GCMP. Their common interests are linked through the policies for development and resource protection.

GCMP functions are carried out to address human impacts on the natural environment, which includes the management of our coral reefs, watersheds, wetlands, and nonpoint source pollution, the annual Guam International Coastal Clean-up, community development, ocean resources planning, geographical information systems, and environmental educational outreach programs to name a few.

The Island Pride campaign is one of the most recent multi-agency effort to promote environmental awareness and stewardship within Guam's community. Joining forces with the GCMP are the Guam Visitors Bureau, Division of Aquatics and Wildlife Resources, Division of Forestry and Soil Resources, Guam Environmental Protection Agency, The Nature Conservancy, University of Guam's Marine Lab, and the Western Pacific Fisheries Regional Management Council. Through collaborative efforts with our network agency partners and community groups, the GCMP has completed workshops and projects on coral reef and seashore protection, pollution prevention, informational sealife kiosks for the Tumon Bay Marine Preserve, and a host of fun-filled family events.

One of the most notable accomplishments of the GCMP was through the efforts of former Administrator Michael Ham. Guam has taken a leadership role and has contributed significant language and direction in the development of the United States Coral Reef Initiative, the U.S. Coral Reef Initiative National Strategy, the International Coral Reef Initiative Call to Action and Framework for Action, and the Pacific Region Coral Reef Initiative Work Program, All Islands Coral Reef Committee.

GCMP has played a major role in Guam's development, including assistance in the areas of flood control, water quality and supply, recreation and related projects. Furthermore, the mission and accomplishments of GCMP have closely reflected the needs and wants of our growing, changing island, and has been in the forefront of community development while working not only to protect, but to preserve our fragile environment.

Above, hikers are all smiles as they enjoy the recently restored Tamilyog Trail in Yap; photo at the top of the page: Black coral MPA in Pohnepei.

The Nature Conservancy: Preserving Great Places

By: Trina Leberer

The Nature Conservancy (TNC) is a non-governmental organization (NGO), whose mission is to preserve the plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. Founded in 1951 in the U.S., TNC now works in 28 countries and employs over 3,000 full-time staff at more than 400 offices around the world. TNC partners with governments, businesses, and communities to achieve lasting conservation goals. TNC conducts science-based work in a non-confrontational and collaborative way, employing an approach called "Conservation by Design", which incorporates an iterative process of setting priorities, developing strategies, taking action, and measuring success.

Since 1990, TNC has worked closely with local, national, and regional partners to protect some of the Asia-Pacific region's most diverse and threatened natural resources. From a modest beginning in the Republic of Palau, we have grown to support conservation projects and programs in the Federated States of Micronesia (FSM), Papua New Guinea, the Solomon Islands, Indonesia, Australia, and China.

In 2002, TNC expanded its Micronesia Program to include the Northern Mariana Islands, Guam, and the Marshall Islands. The vision of the Micronesia Program is: "The people of Micronesia protecting their natural heritage."

The region includes some of the richest biodiversity on the planet with over 1,400 plant species (200 are considered endemic), over 80 bird species (50% considered endemic), over 1,400 species of fish, and over 400 species of coral. Current work in Micronesia includes: assistance with the establishment of nation-wide conservation area networks in Palau and FSM; training Micronesia teams in conservation action planning; support for local conservation NGOs; and expanding partnerships throughout the region.

TNC has also provided regional support in other areas such as invasive species and sustainable finance. Recently, we assisted in launching the Pacific Invasives Learning Network (PILN) a new regional invasive species network, of which Guam is a member.

In 2002, we helped to launch the Micronesia Conservation Trust (MCT). The MCT was recently chosen to manage Micronesia's first subregional small grants program serving Palau, FSM, and the Marshall Islands and funded by the Global Environment Facility (GEF) via the UN Development Programme. This long-term program will support community projects for all the GEF issues (biodiversity conservation, climate change, international waters and land degradation).

Goals for the future include: helping local partners in Micronesia to effectively conserve at least 30% of nearshore marine and 20% of forest resources by 2020; strong local partners throughout Micronesia; and sustained, reliable funding for these efforts, including the endowment of MCT at $20 million by 2020.

For more information, please contact Trina Leberer, Marine Conservation Coordinator, The Nature Conservancy Micronesia Program at cleberer@tnc.org

HRRA
Big Plans for
Hagåtña

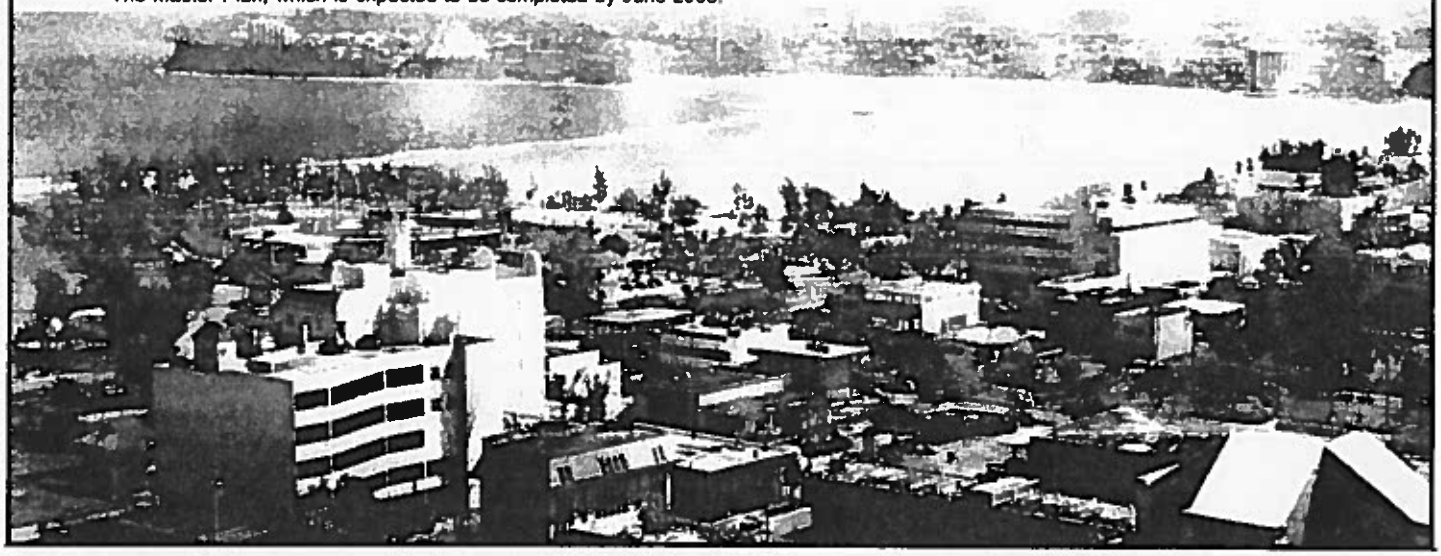
By Nora Camacho

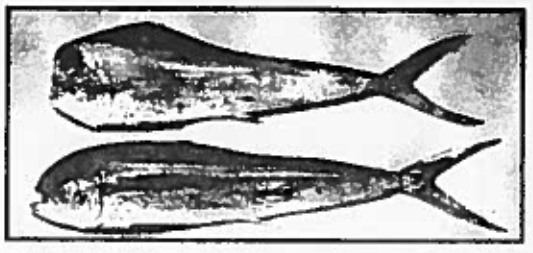
Since May 2005, the Hagåtña Restoration & Redevelopment Authority (HRRA) has been working on a Master Plan for Hagåtña that will eventually be a catalyst for many changes in our Capitol city. HRRA is an autonomous agency of the government of Guam that has been tasked to create a plan to address a variety of urban planning issues such as land uses, zoning, housing, economic revitalization and social welfare of the community.

Imagine a vibrant Hagåtña, a center of cultural, civic, and economic activity. Think of a city with a variety of retail, dining, entertainment, and recreational options, a destination for tourists and residents to visit and learn about the culture and history of Guam, a place where people want to live, work and play. Envision a city that is clean, safe, and pedestrian friendly. This is what HRRA hopes to create with proper planning.

The Master Plan, which is expected to be completed by June 2006, will contain the following sections: Land Use Plan, Zoning Code, Urban Design Guidelines and Regulations, and Implementation Strategy. The entire process is divided into four (4) phases: 1) Data collection and existing conditions analysis, 2) Land use planning, 3) Zoning and design guidelines development, and 4) Implementation planning. At the end of each phase, a document will be drafted, submitted to HRRA and then put out for public review. At the end of the process, the Final Master Plan will be submitted to HRRA for review by the Board Members, then transmitted to the Governor for approval, and then to the Legislature for approval and adoption. At this time, the draft product of the second phase is under review.

This plan will not be a document that identifies specific projects to be built. Rather, the Master Plan will put forth policies that will guide decisions and future development within Hagåtña. The intent of the plan is to encourage smarter growth and sustainability. The document will identify the highest and best uses of the land, encourage infill development, protect historic and environmentally sensitive areas and promote cohesive urban design. The Hagåtña Master Plan will be the first step towards revitalizing, promoting, preserving and protecting the heritage and economic vitality of the City of Hagåtña.





Common Name: Måhimåhi

Chamorro Name: Botague

Scientific Name: *Coryphaena hippurus*

The måhimåhi or botague, in Chamorro also known as dolphinfish throughout much of the world is a local favorite and game fish found in all tropical seas. It migrates into temperate seas during the warmest months of the year. Måhimåhi are surface dwelling fish of the open sea, often found near floating objects which attract and offer limited protection to the small fishes upon which they feed. They feed primarily on flying fish, which is followed even when in flight and seized as they drop back into the water. This requires excellent eyesight and the ability to swim at speeds as high as 50 miles per hour.

Måhimåhi glows with brilliant colors of silver blue and yellow specks when it takes the hook. However, its colors quickly fade when the måhimåhi dies. Mahimahi are migratory and highly seasonal in Guam's waters, although a few occur throughout the year. They are most abundant from February to April and most often caught when the water is moderately rough. In the northwest Pacific, mahimahi spawn in mid-summer when the bulk of the migration is off southern Japan. Those that ready to spawn are rarely near Guam. Each female produces up to several hundred thousand eggs. Juveniles tend to concentrate around floating objects such as seaweed, and may even be eaten by adults.

Måhimåhi grow extremely fast. One aquarium-reared fish grew from one to 37 pounds within a period of 8 months. Nearly all the måhimåhi caught in Guam's waters are less than a year old. Måhimåhi can live up to 5 years, but rarely live longer than three years. They can reach a fork length of 5 feet, 9 inches measured from the tip of the snout to the notch in the middle of the tail. The largest måhimåhi on record weighed 87 pounds and the largest caught near Guam was 50 pounds. Måhimåhi are caught primarily by trolling with lures or squid.

Grilled and topped with salsa, this fish is a tasty delight and a popular menu item in most local restaurants and on fiesta tables.

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Major Objectives of Guam Forestry

By Joe Tuquero

The mission of the Forestry & Soil Resources Division (F&SRD) is to conserve, protect and enhance Guam's vegetative environment and sustain its natural resources, specifically soil, water, and air quality, soil quality.

In collaboration with local and federal government agencies and private land owners, F&SRD continues to construct and promote healthy and productive forests in both rural and urban areas throughout the island through 5 major U.S. Forest Service programs. The 5 programs include: 1. Forest Stewardship Program (FSP), 2. Urban & Community Forestry Program (U&CF), 3. Cooperative Fire Program Resources Conservation Education Program (NRCE), 5. Cooperative Forest Health Management Program (CFHM).

F&SRD addresses major natural resource problems by encouraging private landowners including farmers to enroll in FSP to receive technical assistance and proper plant material to reduce erosion to conserve and improve soil and drinking/recreational water quality. Government and private rural savannah lands are constantly burned consist of basically grasslands and badlands. Burned lands usually results in poor soil quality in which many native trees cannot grow properly due to eroded quality soil.

These eroded soil negatively impact watershed productivity, drinking water quality, and marine ecosystems. F&SRD's role is to promote reforestation of these denuded areas with Acacia and Ironwood trees, which have been proven to grow vigorously in these poor quality soils.

The establishment of these trees decreases erosion, slows down fire spread, builds soil quality, and enhances watershed productivity resulting in healthy terrestrial, aquatic, and marine ecosystems. The reduction of soil erosion and sedimentation into rivers and coastal areas will enhance drinking water quality and marine life.

Improved soil quality will enable native trees to grow prosperously. Another major objective is to eventually re-introduce native plants to these areas to improve native ecosystems and promote cultural identity.

A good example of a collaborative project is the Fouha Bay Project, which is funded through Guam Coastal Management. Fouha Bay is a major watershed which is constantly burned resulting in major damage to soil quality and coral reef quality. Currently, 15 acres of badlands and grasslands are being restored though several erosion-control measures. Approximately 3-4 acres have been planted with erosion-control trees by community organizations and local and federal government agencies.

F&SRD addresses wildland fires through the CFP where the division shifts into fire season (dry season) and routinely patrols Guam's forests and grasslands to suppress wildland fires.

On urban settings such as roadways, parks, beaches, [illegible] other government urban lands, F&SRD, through the U&CF, works with the community and collaborating government agencies to increase native vegetation to improve environmental quality and urban aesthetics.

Through all programs, environmental educational presentations are conducted in schools and community events, and much literature is produce such as brochures and poster to promote the sustainability of Guam's environment and the mission of F&SRD.

(Left, top photo) A young girl picks at the barren earth left scorched after a fire. The bare soil will erode and eventually run off into the rivers and ocean, leaving a murky wake in otherwise prisitne waters. The dark waters make it hard for marine life and vegetation to grow.

(Left - bottom photo) Carelessness and intentional arson cause incredible damage each year to Guam's grasslands and forested areas. Community involvement is critical to growing awareness and appreciation for the island's unique flora and the animal life that depend on it.

(Above photos) Community memebrs planting new trees with the Department of Agriculture, and other agencies fighting to preserve Guam's natural resources, benefit all of us - and countless future generations, too.

Young people learn to care for the island and it's enviroment with a hands-on approach that will take root in their attitude towards preservation and conservation.

Fish for the Future:

Guam's Marine Preserves

By Valerie Brown

Peer into the waters of Tumon Bay Marine Preserve and you'll see something valuable. It's an investment in Guam's future and it's already paying off. No, the bay doesn't contain gold or oil, but it does provide food and shelter for fish – lots of fish. Put a mask on and you'll see schools of goatfish (satmoneti), convict tangs (kichu), and mullet (laiguan) swim by. Snorkel out to the coral beds and you'll be greeted by unicornfish (tataga), parrotfish (palaksi), emperors (mafute), and trevallies (tarakito). Look closer at the coral and you'll see smaller jewel colored damsel fish, butterflyfish, and angelfish.

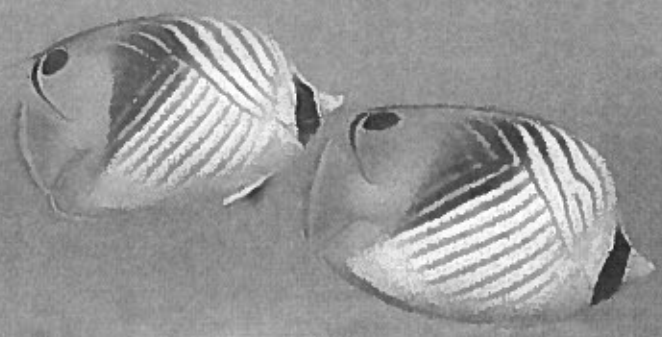
Tumon Bay is just one of five marine preserves that were created to replenish the island's decreasing fish populations. Biologists at the Department of Agriculture, Division of Aquatic and Wildlife Resources, monitor the fish and habitat in these preserves to make sure that they are working. They have found that the numbers of fish in Achang Reef Flat and Piti Bomb Holes Preserves have increased by over 100% since the preserves were fully enforced in 2001. The number of species found within these preserves has also increased. Many people have noticed these changes, they say there are more fish, bigger fish, and that the reef looks much healthier.

Some people see all of the fish in the preserves and want to open them for fishing. They believe that the preserves' work is done. But this is simply not true - the preserves are just starting to work. The preserves provide safe haven for large, mature fish. This is important, because large fish produce many more eggs than smaller fish.

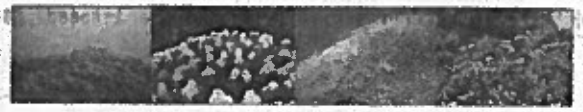
For example, a 5 inch goatfish (tlao) will spawn once a year and produce 1,000 eggs. Only a few of these eggs will grow into adult fish. If this fish is protected in the preserve, it will grow to 10 inches. Once it reaches this size, it will spawn 4 or 5 times a year and produce about 25,000 eggs each time - a total of 100,000 to 125,000 eggs each year. This means that one 10-inch fish is worth over one hundred 5-inch fish!! If we protect the fish in the preserves long enough to become full size adults, they will produce enough eggs to increase fish populations all over the island.

The preserves are well on their way to providing fish for the future, but we can help this process along by keeping all of Guam's coral reefs healthy. Many human activities can degrade fish habitat. Throwing trash on the beach or in the water not only looks ugly, it is also unhealthy for many sea creatures. Erosion from improper development and wildland fires destroys food and shelter needed by fish. And don't forget what your feet can do – when you step on coral you destroy fish habitat. You can help the preserves provide more fish for the future: always dispose of pollutants properly, pick up your trash, support reforestation efforts, report wildland arson, and watch where you step.

For more information, please call the Division of Aquatic and Wildlife Resources (DAWR) at 735-3955/56.



10 Things to Help Our Coral Reefs



These are just 10 things we can do as a residents of Guam to help preserve our coral reefs for future generations.

1. **Don't pollute.** Never put garbage or human waste in the water. Don't leave trash on the beach.

2. **Keep it clean.** You may not pollute. You might even participate in the occasional organized cleanup. And for this, pat yourself on the back. But have you considered taking it one step further and carrying away the trash that others have left behind?

3. **Recycle.** This is the first step each of us can take to make a change. Recycle anything and everything. If your community doesn't have a program, do it anyway, and get one started. To see where to take recyclable items, please refer to the Guam Recycling Guide located in all telephone books and put it on the refrigerator for reference. If you are in the military and have base access, Andersen Air Force Base has an excellent recycling program that takes glass, cardboard, aluminum, and all paper. Starting April, AAFB will be taking plastic bottles (I and II). Drop off recyclables at Arc Light Recycling Center, just past AAFB main gate. There is a 24 drop-off. For more information, call 671.366.1849.

4. **Conserve water.** The less water you use, the less runoff and wastewater will be produced. Runoff and wastewater eventually finds its way back into our oceans. Remember, "If it's yellow, let it mellow. If it's brown, flush it down."

5. **Report dumping or other illegal activities.** Environmental enforcement cannot be everywhere, and your involvement can make a big difference. To report illegal dumping, contact Guam Environmental Protection Agency at 671.475.1658.

6. **Be an informed consumer.** Support reef-friendly businesses. Ask the dive shop, boating store, tour operators, hotel and other coastal businesses what they are doing to save the coral reefs. This is especially important here. Let them know you are an informed consumer and care about reefs.

7. **Don't anchor on the reef.** While boating near a coral reef, use available mooring buoy systems.

8. **While diving, swimming, or snorkeling, don't touch!** Take only pictures and leave only bubbles! Keep your fins, gear, and hands away from the coral, as this contact can hurt you and will damage the delicate coral animals. Stay off the bottom because stirred-up sediment can settle on coral and smother it.

9. **Volunteer.** Volunteer and participate in community coral reef monitoring programs. Get involved in your local "save the river (bay, lake, or other estuarine environment)" program. Remember, all watersheds affect the oceans, thus, the coral reefs.

10. **Avoid the use of chemically enhanced pesticides and fertilizers.** These products end up in the watershed and may ultimately impact the waters that support coral. For more information regarding alternatives to pesticides and fertilizers, please contact John C. Borja at the Department of Agriculture and Wildlife at 734.3946

Marine Debris Spotlight: Cigarette Butts

Keep Your Butts... *off the Beach*

GUAM IS NOT AN ASHTRAY.

By Romina King

Sitting in my car at the ITE intersection, the electronic blue flicker of Guam's only billboard was lulling me into sweet revelry, as I patiently waited for the left-turn green arrow to appear. Suddenly, it began snowing. Snowing on Guam?! Yes. It was snowing cigarette butts. They were flying out of various, open windows of cars also waiting for the left turn signal and landing on the center divider with a certain madness and urgency. When did the divider become a cigarette butt receptacle? On that note, when did the island become a community ashtray?

I'm fairly certain that reader is musing, "What's the big deal? Get over it. It's just a cigarette butt." Just a cigarette butt, eh? No big deal? Perhaps the reader will think differently after this article.

Analysis of a cigarette butt

A cigarette butt is a cigarette filter after the cigarette has been smoked. Contrary to popular belief, cigarette butts are NOT BIODEGRADABLE. Although cigarette butts are soft, white and bear a striking resemblance to cotton, THEY'RE NOT COTTON. The majority of cigarette butts are composed of 12,000 plastic like cellulose acetate fibers bundled together. It can take anywhere from 2-25 years for the fibers of one cigarette butt to decompose into a fine plastic powder.

Cigarette filters trap tar. Tar refers to the hundreds of chemical and gas particles generated by each burning cigarette that and includes arsenic, vinyl chloride, acetone, mercury and lead. Modern filters trap roughly half the tar while capturing one-third of a cigarette's formaldehyde and two-thirds of its hydrogen cyanide. These additives are trapped in cigarette butts but can leach easily into water. The nicotine trapped inside 200 used filters is sufficient to kill an adult human - 50 to 60 milligrams. Nicotine is extremely deadly in its purest form and is used as a powerful insecticide. It is easily absorbed through the skin and serious, even fatal poisoning can occur if too much is absorbed. Nicotine is a potent poison that causes problems in the digestive and circulatory organs.

Why dumping cigarette butts on the ground is bad

Imagine thousands of nicotine laden cigarette butts getting washed into our watershed after a good rain. Generally, Guam is one giant watershed and how often does it NOT rain? Eighty percent (80%) of cigarette butts on the ground end up in our water systems and inevitably, the ocean.

Secondly, cigarette butts can appear appetizing to birds, fish, and small children, yes, small children, thus leading to ingestion. For wildlife, ingestion can lead to starvation or malnutrition if the ingested filters block the intestinal tract and prevent digestion. Swallowed filters can accumulate in the digestive tract, tricking the animal into thinking that it is full. Animals will then stop looking for real food, thus leading to starvation. Ingested items may also block air passage and prevent breathing, thereby causing death by asphyxiation. For children, ingestion of cigarette butts may lead to choking, convulsions, and nausea. Would you want your kid eating the butt that was in some random person's mouth that he/she found on the ground?

Thirdly, it's illegal! Dumping cigarette butts on the ground is considered 'littering', therefore illegal and punishable by law. Essentially, improper disposal of cigarette butts can result in a fine from 100 – 1000 USD and if it's a second offense, picking up litter for a minimum of eight hours in a public place.

Lastly, cigarette butt litter is just plain ugly. Guam is a beautiful island that we are blessed to live on. It's not an ashtray.

How many cigarette butts make it to the beach?

According to The Ocean Conservancy, organizer of the annual International Coastal Cleanup (ICC), the number one piece of litter ***in the world***, picked from beaches, rivers, and streams is...that's right...you've guessed it...CIGARETTE BUTTS. On Guam, in 2005, approximately 6222 cigarette butts were collected during the International Coastal Clean-up. Keep in mind, only the cigarette butts on the surface of the beaches were collected and represent a small fraction of what is really out there.

According to a recent poll, the majority of respondents believed that cigarette butts are litter and anti-littering laws must be enforced against violators.

The only item collected more than cigarette butts during the 2005 ICC were beverage cans on Guam. (Which is atrocious because recycling aluminum is a viable option, not to mention an option that pays...5 cents a pound! But beverage cans are not the spotlight of this column, cigarette butts are).

What we can do to help

Stop flicking cigarette butts out the car window. Stop carelessly throwing them on the ground. Put cigarette butts in trash receptacles. Carry a personal ashtray (i.e. film canister, empty Alkoids tin) at all times. Gently remind friends and family who improperly dispose of cigarette butts why it's not cool (see section regarding why dumping cigarette butts on the ground is bad.) For more ideas, please visit...www.nobuttsaboutit.net and www.cigarettelitter.org.

Conclusion

Cigarette butts, classified as marine trash and debris, can pose a threat to water quality, fish, marine mammals, sea turtles, and small children; detract from the aesthetic quality of recreational shore fronts; and increase the cost of public maintenance.

Proper cigarette butt disposal is easy! Guam is our island, not our ashtray. So let's cleanup up our BUTTS!

According to Guam Code Annotated, Title 10, Chapter 51, §51205.

"(a) It shall be unlawful for any person to willfully or negligently dump, deposit, throw, leave or abandon any litter upon any public highway, street, alley or road, upon public parks or recreation areas or upon any other public property except as designated for such use, or upon property owned by another person without written permission of the owner, or into any bay, channel, harbor, river, creek, stream, reservoir, coastal waters, or other waters of the Territory."

The entire law may be viewed at the following URL http://www.guamattorneygeneral.com/gca/10gc051.pdf)

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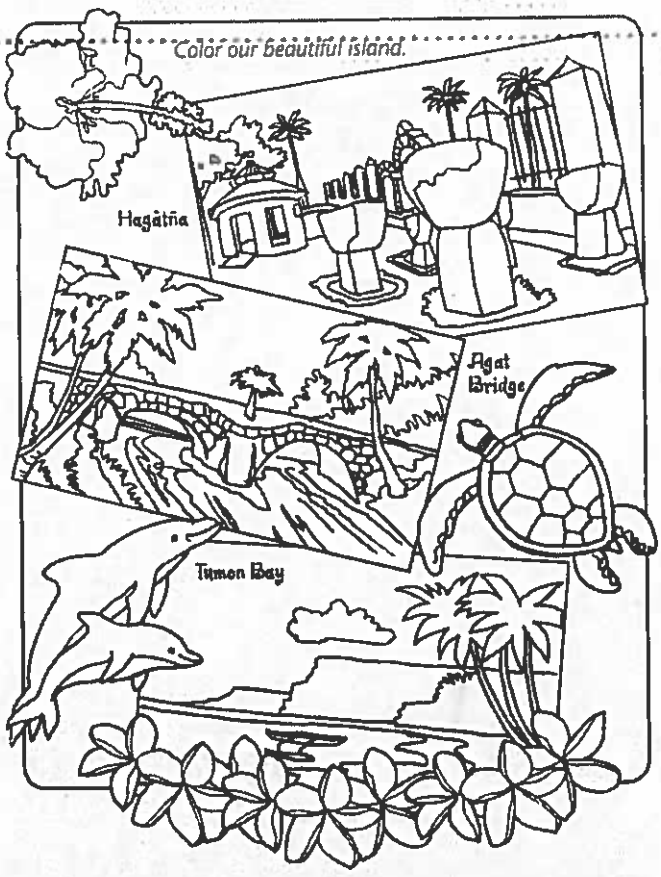

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CORAL
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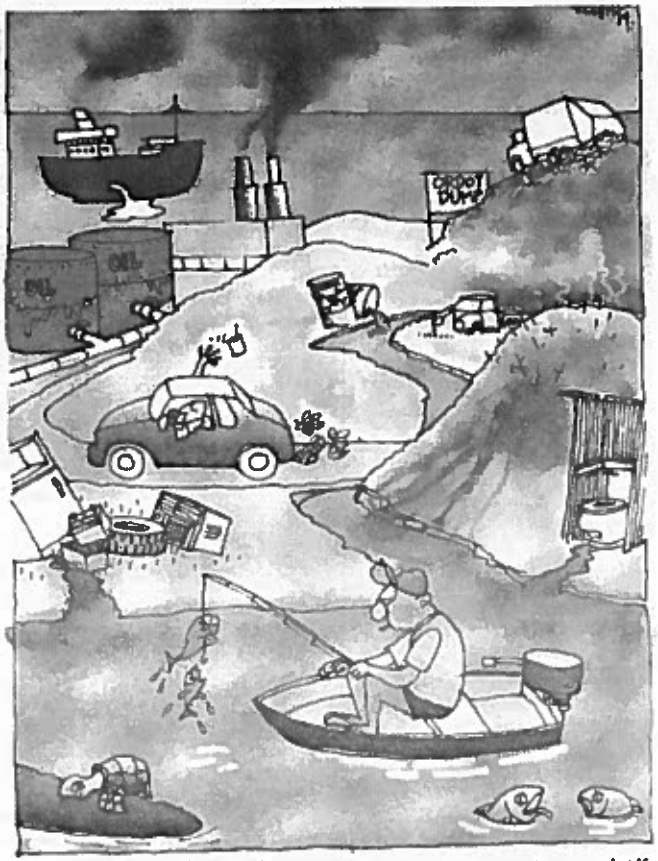

"Funny how the fish seem to want to get caught"

FishBowl 2006

By Linda Tatreau

The idea of FishBowl was conceived and developed by Marine Mania in 2001. All igh Schools of the Marianas are invited to an academic competition focusing on the ean. Local businesses and government agencies provide support.

The winning team is given the privilege of naming a geologic feature on the sea floor near Guam. This is possible through Dr. Patricia Fryer of the Geology Department of the University of Hawaii.

FishBowl 2001 was won by St. John's School. They named a robust spreading center to the southwest of Guam. The name is now officially, Malaguaña-Gadao Spreading center.

FishBowl 2002 was won GWHS. They named a huge volcano to the southeast of the Malaguaña-Gadao spread- center. They chose to name the volcano Pàtgon Masala.

FishBowl 2003 was won by GWHS. They named the spreading center from the rthern end of Malaguaña-Gadao to 18 degrees north latitude—Sasalaguan Spreading nter.

FishBowl 2004 was won by Simon Sanchez High School. They named a giant fault at runs north from the Mariana Trench past the southern end of Guam. This fault is now icially, the Chalfi Fault.

FishBowl 2005 was n by GWHS. They named a ge, blue mud volcano near Marianas Trench. The mud lcano now goes by the name Asut Tesoru.

The competition prom- s to be good this year as stu- nts get ready for the exciting allenge of another Fishbowl ent.

Top photo: Students illustrated their name for the geographic phenomenon by using the Chamorro legend of Gadao and Malapang as inspiration.

Center photo: Senator Carmen Fernandez, (D) Yona, Education Commitee Chairperson in the 27th Legislature of Guam congratulates the 2004 winners from Simon Sanchez High School.

Bottom photo: The winning team from George Washington High School are pictured during the 2005 competition. The team had the honor of naming massive blue mud volcano near the Marianas Trench - site of the lowest point on Earth.

WHAT:

FishBowl 2006

WHEN:

Saturday, April 22nd

WHERE:

George Washington High

TIME:

9:00 A.M. to 1:00 P.M.

Lunch will be provided. If your school would like to participate, contact Linda Tatreau at lindian@ite.net or call 789-7704 or 734-0731

Earth Day 2006

By Peggy Denny

The Guam Environmental Protection Agency, in conjunction with the Environmental Education Committee, is proud to announce the celebration of Earth Week 2006 from April 16 to 22. This year's Earth Week theme is "The 3R's: Reduce, Reuse, Recycle."

Earth Day will be celebrated on Guam, as it will be worldwide, on Saturday, April 22, 2006. This year, Guam EPA and the Environmental Education Committee are organizing several events to celebrate Earth Week and raise environmental awareness. These activities will culminate with the third annual Earth Week Island Pride Festival, which will be held on Earth Day, Saturday, April 22, at Ypao Beach Park from 9:00 a.m. to 3:00 p.m.

As with most annual events, the coordinators strive to make the current year's event bigger and better than the previous year, and this year the Guam EPA and the Environmental Education Committee are working hard to do just that. The festival will showcase several bands; cultural dance troupes; a drumming group; at least 40 exhibits, most of which will be interactive; games with an environmental theme, and plenty of food and drinks.

A new addition to the fair this year, and one that is certain to be a highlight of the day, is the "Trash 'n Fashion Show," featuring fashions made from recycled, reused, or biodegradable non-hazardous household materials. Anyone can participate, and you can pick up application forms at the Bureau of Statistics and Plans in the Governor's Complex at Adelup or call 472-4201/2/3 for more information.

Earth Week is a time to celebrate achievements we have made and encourage new concepts to accelerate environmental progress. In light of our theme of "The 3R's: Reduce, Reuse, Recycle," some of the participants in the Island Pride Festival exhibits will be local recycling companies of a wide variety to highlight the services they are providing to our community.

Earth Week is also a time to renew our commitment to act as responsible stewards of our island and our environment, a time to "Think globally, act locally." So we will be asking everyone in attendance to separate the trash they generate throughout the day and deposit it into painted 55-gallon drums identified for "Aluminum Cans Only," "Food Waste," and "Other Trash." We must all learn to do our part, and this is an easy, fun way to begin.

We encourage everyone to attend the Earth Week Island Pride Fair at Ypao Beach, Saturday, April 22, from 9:00 to 3:00. It is a wonderful family event and is sure to be educational, entertaining, and just plain fun!

Celebrate Earth Week 2006

Island Pride Festival

Reduce · Reuse · Recycle
Guam Earth Week 2006

Saturday, April 22, 2006 • 9 a.m. to 3 p.m.
Ypao Beach Park Amphitheater, Tumon

Have fun learning about Guam's environment at this FREE event for the whole family!

FREE T-shirts and Prizes!
Live Entertainment!
Games and Contests!
Food and Drinks!
Interactive Displays!

Visit the Earth Week 2006 Art Contest display at Guam Premier Outlets from April 15 to 23!

Sponsored by Guam EPA, Guam Coastal Management Program, Guam Department of Agriculture, Western Pacific Regional Fishery Management Council, Guam Visitors Bureau, and the Environmental Education Subcommittee of the Guam Watershed Planning Committee, with support from these fine sponsors:

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Reduce.
Reuse.
Recycle.

Don't waste Guam's future.

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MAN, LAND & SEA
News of Guam and Her Ocean Environment
OCTOBER NOVEMBER DECEMBER 2006 VOLUME XVI, NO. 4 • COMPLIMENTARY COPY

Hafa Adai Oscar Elton Sette!

By: Esther Gumataotao & John Calvo

The National Oceanic Atmospheric Administration (NOAA) Oscar Elton Sette vessel came to port Saturday, October 1, 2005 before embarking on the Guam leg of the Marianas Archipelago Research Cruise. The Guam Fishermen's Cooperative Association and several government and community groups welcomed the crew and the visiting scientists with a fiesta in their honor to commemorate their 2005 visit to Guam, two years after their last stopover. To bid them a successful cruise, the people of Guam presented the Captain and his crew a gift of woven coconut baskets filled with fresh local fruits and vegetables for their trip. Chief Scientist Dr. Robert Shroeder expressed a warm "thanks (to the people of Guam) for the great fiesta" in an email to John Calvo of the Western Pacific Regional Fishery Management Council. "We really had a wonderful time!"

The NOAA Ship is named for Dr. Oscar Elton Sette. Dr. Sette initiated the development of fisheries oceanography and according to many fisheries scientists, is the father of modern fisheries oceanography in the United States. He is recognized both nationally and internationally for many significant contributions to marine fisheries research. Oscar Elton Sette supports the scientific missions of NOAA's National Marine Fisheries Service Pacific Islands Science Center in Honolulu, Hawaii. The ship normally operates throughout the central and western Pacific, and conducts fisheries assessment surveys, physical and chemical oceanography, marine mammal projects and coral reef research. It collects fish and crustacean specimens using bottom trawls, long lines, and fish traps. Plankton, fish larvae and eggs are also collected with plankton nets and surface and mid-water larval nets.

Brent Tibbatts of the Division of Aquatic and Wildlife Resources (DAWR) of the Department of Agriculture and Val Porter, Coral Reef Monitoring Coordinator who is assigned DAWR, as well as Nick Pioppi, a graduate student from the University of Guam Marine Laboratory (UOGML) participated in the Guam leg of the research cruise, while Dr. Alex Kerr of the UOGML participated in the CNMI segment. According to Brent Tibbatts, "it was a great opportunity to survey some of the more remote underwater sites around Guam and to work with federal scientists on the cruise. One of the highlights of the cruise was the use of the BOTCAM (Bottom Camera), which is a remote camera that was deployed at 100 fathoms (600 feet) and baited to attract deepwater fauna (animals). This was a rare opportunity to observe these creatures alive in their natural environment."

The ship additionally conducts routine scuba diving missions for the Honolulu Laboratory. For added safety, The Oscar Elton Sette carries a recompression chamber for serious diving missions in distant areas.

Photo by Karl Hedberg taken from the website www.moc.noaa.gov.

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Editor
Esther Gumataotao

Bureau of Statistics and Plans
Anthony P. Sanchez
Acting Director

Guam Coastal Management Program
Evangeline D. Lujan
Administrator

GCMP Staff
Raymond Caseres, Amelia De Leon, Francis L.G. Damian, Terry M. Perez, Esther Gumataotao, Victor Torres, and Timothy Semuda

NOAA Pacific Islands Assistants
Dave Burdick and John Tomczuk

Subscription Information
To subscribe to the Man, Land, & Sea Newsletter, please contact:
Evangeline Lujan
Man, Land, & Sea Newsletter
Guam Coastal Mgmt. Program
Bureau of Statistics and Plans
PO Box 2950
Hagåtña, Guam 93932

Phone: (671) 472-4201-3
Fax: (671) 477-1812
Email: vange@mail.gov.gu

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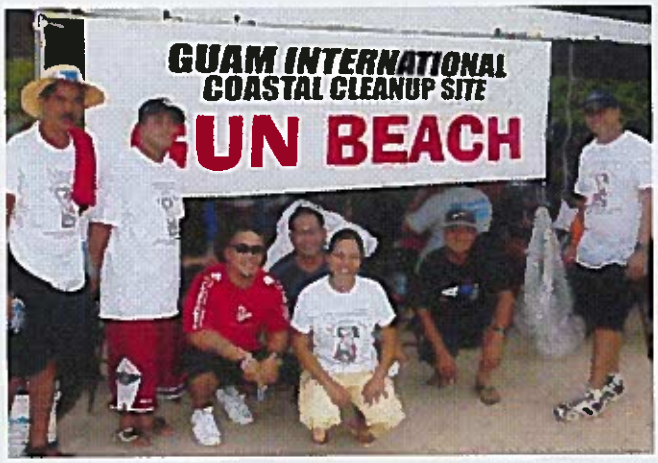
Thousands Express Island Pride at International Event

By: Esther Gumataotao



At Gun Beach–Guam's northern coastline, volunteers pose with site leader John Calvo (center back) and International Coastal Cleanup coordinator Francis Damian (far right).

Photos courtesy of John Calvo

On Saturday, September 17, 2005, volunteers of all ages participated in one of the biggest environmental events recognized across the globe – the International Coastal Cleanup. Lead by the Guam Coastal Management Program, this annual cleanup, held every 3rd Saturday in September is the 11th year that Guam has participated in.

Even in the rain, groups led by the military, school groups, community groups, and government employees came together before the break of dawn clearing trash along shorelines from Tanguisson Beach down to Umatac Bay. Shoreline site leaders have indicated and recorded that volunteer participation more than doubled this year compared to last year's cleanup.

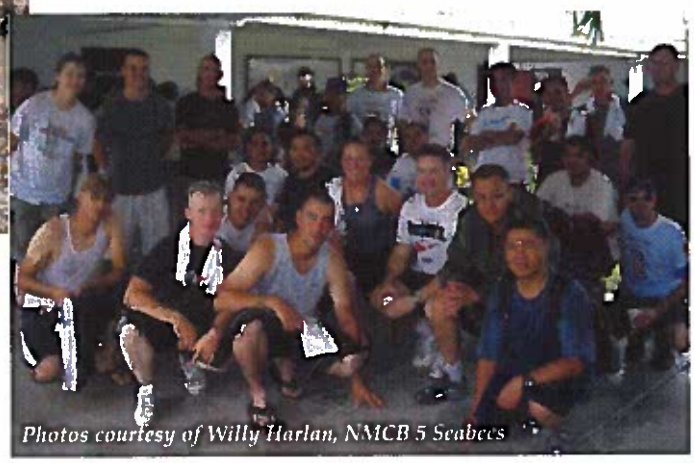
"Ipan had an amazing turnout with upwards to 350 people, considering it rained for a good two hours. The majority of these people consisted of George Washington High School students. Overall, about 50 tires were collected and one whole container was filled with metals. The rest of the garbage was contained in solid waste or cans. Midway through the cleanup, we ran out of bags for picking up trash. When it was all said and done, due to Linda Tatreau's leadership and the strong dedication of the students it was a huge success and a fun filled morning for all involved in the cleanup" said volunteer John Tomczuk. Also picking up trash was Seabee Willy Harlan on Guam's southern shoreline, Agat Bay, "the rain didn't stop us, we're glad to help out the community in any way we can."

Microwaves, freezers, televisions, and washers have become recurring trash items recovered during the cleanup, in addition to common plastic drink bottles, aluminum cans, and cigarette butts. Guam's participation in this event is important as the information gathered on collected trash will be recorded and sent to the Center for Marine Conservation in Washington D.C. for tabulation and the results will be published in the U.S. International Coastal Cleanup Summary Report. The data will be reported according to geographic location and used for environmental studies. Previous cleanup results have already been used in the development of international and environmental laws.

"This year's coastal cleanup consisted of many firsts. It was the largest and record-breaking volunteer turnout ever held, compared to the past 10 coastal cleanups. It included the greatest number of shoreline sites we've ever covered in a single day, and it occurred during the rainiest day, which I'm happy to report didn't dampen the spirits and goals of the many volunteers that made the event a huge success," said Francis Damian, local coordinator for the international event.

International Coastal Cleanup 2005

Even the rain didn't stop NMCB 5 "The Professionals" from helping out the local community. From left is CEI Domingo Godoy and UTI Rodney Inciong with a tire in his hand.



Photos courtesy of Willy Harlan, NMCB 5 Seabees

The NMCB 5 (Seabees) "The Professionals" stationed in Camp Covington pose after picking up debris and trash at Agat Beach, Guam's southern coastline.

Sette Highlights

Val Porter, Coral Reef Monitoring Coordinator rolls off the boat in a recent expedition with the Sette research crew. Already in the water is Brent Tibbatts.

Photos courtesy of Val Porter.

Looking enthusiastic is Brent Tibbatts, Biologist with the Department of Agriculture's Division of Aquatics and Wildlife Resources.

NPS Pollution... What, How, and Why Not?

By: Sonya Shiegstad

In 1998 President Clinton signed Executive Order 13089 calling on all federal and local governments to take actions that preserve and protect coral reefs. The President took this action because the world now recognized the importance of coral reefs to the entire planet. Reefs provide protection from waves, they serve as a nursery ground for fish and other tasty critters, and they support a diverse array of organisms (some of which have been found to contain chemical compounds with medicinal properties, even anti-cancer properties). Coral reefs have been termed the "rainforest of the sea," and there is a growing movement of concerned individuals, businesses, and governments to protect this valuable resource.

GCMP File Photo

In Ylig Bay, murky water indicates soil runoff after heavy rains. Through rainfall, pollutants are carried over and through the ground settling into rivers, wetlands, coastal waters, and even our underground sources of water such as the water lens in northern Guam (Guam's only aquifer).

One of the most damaging threats to coral reef health is NON-POINT SOURCE POLLUTION, or NPS pollution. This category of pollution includes sediment, fertilizers, chemical compounds, and anything else that washes out to the reefs from multiple undefined sources. As a quick example, a POINT SOURCE would be a factory that is piping some sort of waste directly out into the ocean, but a NON-POINT SOURCE could be oil product products reaching the ocean from little leaks in 2.000 separate cars on the island.

So who is the big culprit here? I am. You are. Look to the left and the right of you... those people are culprits. Each and every one of us is contributing in some way or another to NPS pollution, and therefore my actions, your actions (his, her, its actions) are threatening the health of our priceless reefs.

Well this doesn't sound very positive, does it? Now don't stop reading, this isn't going to be a lecture. I think we can actually put a positive spin on this. If all of US are the culprits, then any small changes that WE can each make in our daily routine will decrease the amount of NPS pollution hitting the reefs, right?

Here are a couple of examples:

When Fred changes the oil in his car, he waits until nobody is looking and then pours the old oil into the gutter. Out of sight, out of mind, right? WRONG!!! That oil travels straight down the storm drain and out into one of Guam's shallow bays. When Fred takes his son to the beach the next day, little does he realize that they are swimming in a bath of petroleum bi-products. At least Fred and his son can go home and take a shower, those poor corals can't go anywhere.

Now let's look at Mary down the street. Mary has a beautiful garden and manicured lawn, and she works hard to keep it looking wonderful. One of the things she does is spray about 2 gallons of pesticide on her lawn every month. If we read the

back of her Bug-Away bottle, we notice that the recommended amount is 1 quart every 6 months. All of the excess pesticides don't remain on her lawn. Guess where those chemicals end up? That's right! The chemicals flush down through grass, soil, and limestone and end up in either our ocean, or our freshwater supply. Ouch! Sounds like we need to rewrite that old nursery rhyme:

Mary, Mary, quite contrary,
How does your garden grow?
I kill all the flies,
But to my surprise,
I kill the reef below!

Fred and Mary can easily reverse these negative actions into positive ones. Fred simply needs to find an appropriate disposal spot for his used oil (a small fee at almost any auto shop), and Mary can actually save some money and stretch those 2 gallons of pesticides out for the next 4 years. And now, shazam! Both Mary and Fred have reduced the amount of NPS pollution in our ocean. You and I should follow suit by properly disposing of wastes, by being careful in how much pesticide and fertilizer we apply to our lawns, and also by minimizing soil erosion from our properties (plant a tree or put up a simple silt fence during land clearing and grading). Small changes in our daily routines can lead to a huge improvement in our reef health.

Does this sound too good to be true? Well, actually it is. Every resident of Guam can make a positive difference to our reefs, but there are still some big changes that should be made. Guam lacks adequate storm water disposal infrastructure. The consequence of this is that when rain hits the island, water runs downhill and picks up bare soil, pesticides, fertilizers, oil products from the road, and this nasty mess flushes straight out into the ocean. A proper storm water disposal system would help, and so would enforcement of proper erosion control measures at construction sites.

So how can you and I make a difference when it comes to making the big changes? The best thing to do is voice your opinion, tell others about the problems, and let's show our elected representatives how we feel. If we don't say something, who will? Fred and Mary are going to make changes, and so are we, so let's encourage the island as a whole to also make changes.

Sonia Shjegstad is a former GCMP employee. She now works for Environet, Inc. in Honolulu, Hawaii as an environmental scientist.

WHAT IS NONPOINT SOURCE (NPS) POLLUTION?

Natural and human-made pollutants are carried away through rainfall moving over and through the ground. These pollutants finally settle into lakes, rivers, wetlands, coastal waters, and even our underground sources of water.

What are pollutants?
Some types of pollutants include:

- Excess fertilizers, herbicides, and insecticides from agricultural lands and residential areas;
- Oil, grease, and toxic chemicals from urban runoff and energy production;
- Sediment from improperly managed construction sites, crop and forest lands, and eroding stream banks;
- Salt from irrigation practices and acid drainage from abandoned mines;
- Bacteria and nutrients from livestock, pet wastes, and faulty septic systems.

It is important to know that these pollutants have harmful effects on drinking water supplies, recreation, fisheries, and wildlife.

What causes nonpoint source pollution?

According to the U.S. Environmental Protection Agency (USEPA), we all play a part. Nonpoint source pollution results from a wide variety of human activities on the land. Each of us can contribute to the problem without even realizing it (see examples on page 4).

For more information on nonpoint source pollution visit the US Environmental Protection Agency's website at www.epa.gov .

PREVENTING NPS POLLUTION – WHAT CAN YOU DO?

• Keep litter, pet wastes, leaves, and debris out of street gutters and storm drains – these outlets drain directly to lake, streams, rivers, and wetlands.

• Apply lawn and garden chemicals sparingly and according to directions.

• Dispose of used oil, antifreeze, paints, and other household chemicals properly, not in storm sewers or drains. *Hasso Guam is program overseen by the Guam EPA, which collects these chemicals. Check the daily newspaper for the next collection schedule.

• Clean up spilled brake fluid, oil, grease, and antifreeze. Do not hose them into the street where they can eventually reach local streams, rivers, and lakes.

• Plant ground covering on your property. This controls soil erosion and stabilizes erosion-prone areas.

• Have your septic system inspected and pumped, at a minimum, every 3-5 years so that it operates properly.

• Purchase household detergents and cleaners that are low in phosphorous to reduce the amount of nutrients discharged into our rivers, lakes, streams, and coastal waters.

• Manage animal waste to minimize contamination of surface water and ground water.

• Protect drinking water by using less pesticides and fertilizers.

• Reduce soil erosion by using conservation practices and other applicable best management practices.

• Use planned grazing systems on pasture and rangeland.

• Dispose of pesticides and containers, in an approved manner.

For more information on nonpoint source pollution visit the US Environmental Protection Agency's website at www.epa.gov .

Kika's Kids Page

Poisonous Marine Life Word Search

Look up, down, forward and backward.

P	L	L	I	O	N	S	C
R	E	F	F	U	P	T	O
N	E	U	R	C	H	I	N
L	N	E	P	H	S	N	E
S	O	E	S	O	E	G	S
O	G	S	H	T	N	R	H
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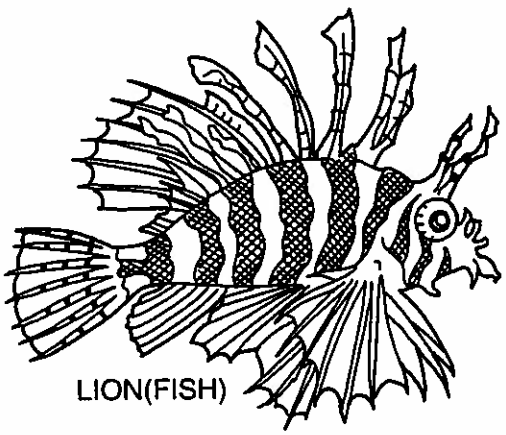
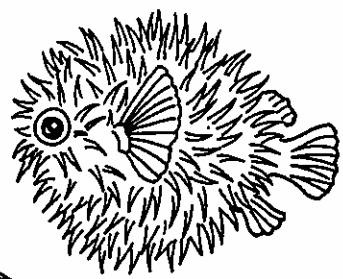
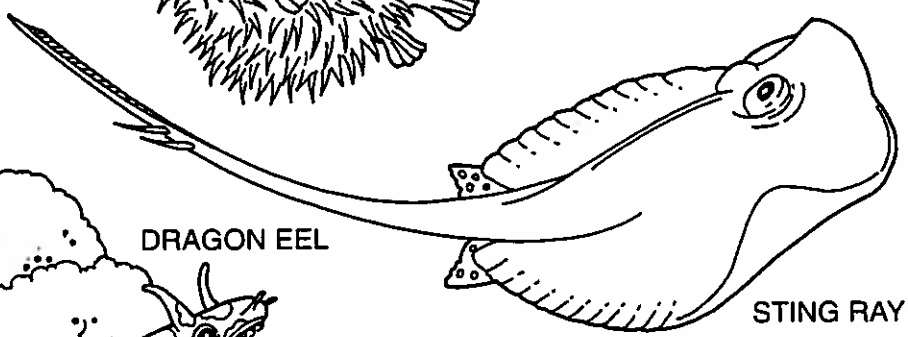
E	R	H	C	O	S	Y	L
F	D	Y	A	N	F	F	L



LION(FISH)

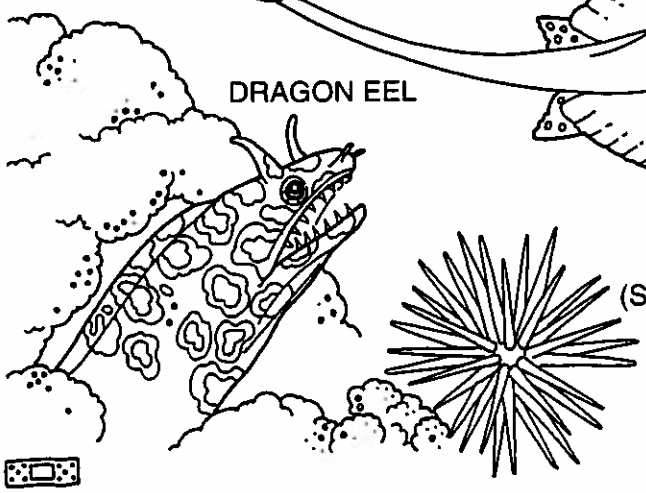
PUFFER(FISH)



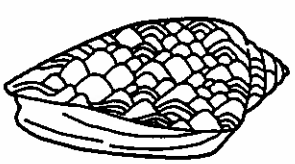


DRAGON EEL

STING RAY



(SPINY) URCHIN



CONE SHELL

DO NOT TOUCH OR BOTHER ANYTHING ON THE REEF, and you won't get hurt.

What In The World Is This?

Common Name:
Coconut Crab or Robber Crab
Chamorro Name:
Ayuyu
Scientific Name:
Birgus latro

The coconut crab or ayuyu as it is called is a native species to Guam. The huge crab, a local delicacy, was once a popular dish found on fiesta tables or family parties. It can grow quite large, with a legspan of up to 3' or 90 cm.

Ayuyu comes from the same family as the hermit crabs. They begin their life in the sea where adult females lay their eggs and live their adult life on land. The eggs hatch into tiny larvae that drift with the currents for a few months before settling to the bottom where they transform into tiny crabs. They climb into a seashell and crawl up on the beach. At this time, they look very much like hermit crabs. Soon they leave their seashell and depend on their own hard shell for protection. Adult coconut crabs have a distinctive bluish hue on their exoskeleton. They also have gills that they keep moist by dipping their back legs into pools of water.

The ayuyu digs holes in which they hide during the day and at night they come out to look for food. They will eat almost anything including fruits, plants, rotting wood, and their favorite – coconut. Using their strong claws, they tear away the tough coconut husk and then crack the nutshell. They have incredibly strong claws that can grip and tear any object within reach.

Ayuyu grow very slowly and are easily harvested. On Guam, this gigantic crab is rare and even small ones have become hard to find, and in some places can no longer be found. Taking under sized crabs is illegal and carries a penalty of up to $500 or 90 days in jail, or both.

Man Land & Sea Newsletter
Guam Coastal Management Program
Bureau of Statistics & Plans
P.O. Box 2950
Hagåtña, Guam 93932

MAN, LAND & SEA
News of Guam and Her Ocean Environment
JULY AUGUST SEPTEMBER 2005 VOLUME XVI, NO. 3 • COMPLIMENTARY COPY

Recycling Introduced to Parade Goers

By: Esther Gumataotao

The Guam Environmental Protection Agency (Guam EPA) and the Guam Coastal Management Program collaborated with several partner agencies and community groups to make this year's Liberation Day parade an "eco-friendly" Island Pride event. For the first time, recycling bins were placed along the parade route in an effort to divert aluminum cans from the dump. Parade goers were encouraged to use the bright yellow bins marked "Aluminum Cans Only" to dispose of *cans only*. Youth volunteers monitored the recycling bins and managed to collect approximately 10,000 aluminum cans during the parade.

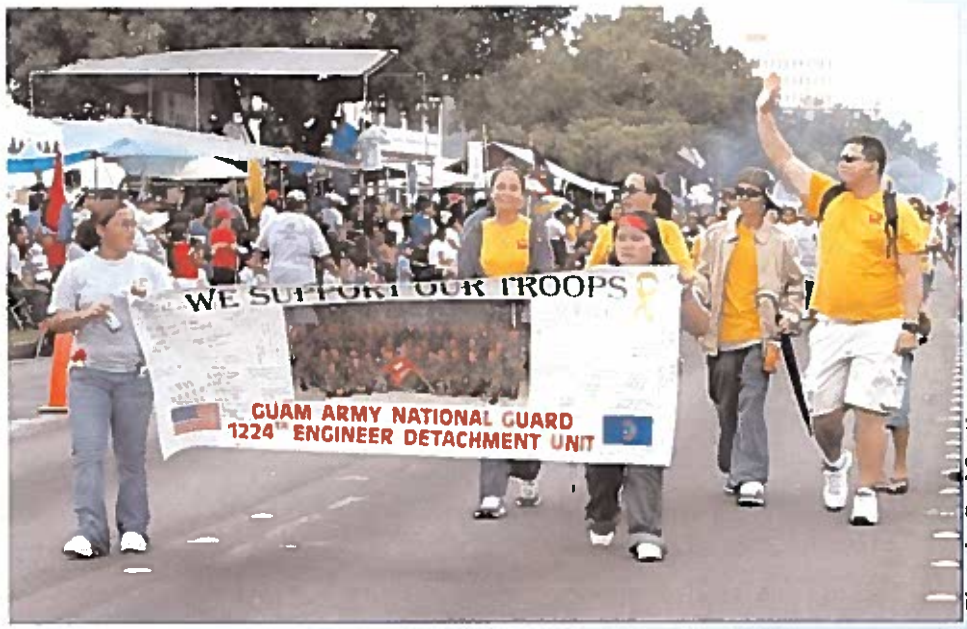


Photo by Roel Santiago

A support group for the Guam Army National Guard waves to the crowd at the eco-friendly liberation day parade.

"Recycling is a major component of any sustainable waste management system," said Guam EPA Acting Administrator Randel Sablan. "We need to consider recycling options at all public events, large and small," he added.

Several community groups also volunteered to help with the project. The groups include Marine Mania, Island Girl Power, the Santa Barbara Parish Altar Servers, and Guam Youth for World Youth Day (Hagåtña and Chalan Pago chapters). The youth from DYA also contributed in this effort; they painted over 70 bright yellow, fifty-five gallon drums. Marine Mania, Guam Power Authority, and Total Chemical Resources provided the drums.

Corporate sponsorship for this activity was provided by Anheuser Busch and Ambros, Inc., the Guam Chamber of Commerce, the Pacific Daily news, Guam Automobile Dealers Association, Deloitte Touche LLP, Guahan Waste Control dba Mr. Rubbishman, and Next Generation Information Integrators.

As part of the Environmental Education Committee, the Guam Coastal Management Program of the Bureau of Statistics and Plans co-sponsored this Island Pride event with Guam EPA, the Western Pacific Regional Fishery Management Council, The Nature Conservancy, Marine Mania, and the Office of the Governor.

Guam EPA publishes the *Guam Recycling Guide*, a directory of recycling services available on Guam. The guide can be found in 2005 telephone directories or on the Web site, www.guamepa.govguam.net, and can be downloaded directly.

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Evangeline Lujan
Man, Land, & Sea Newsletter
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Bureau of Statistics and Plans
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Phone: (671) 472-4201-3
Fax: (671) 477-1812
Email: vange@mail.gov.gu

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2004 Guam Statistical Yearbook Released

By: Monica Guerrero

Governor Felix Camacho presents the yearbook to Dr. Jose Cruz. Looking on is Monica Guerrero and Tony Sanchez.

On June 2, 2005, Governor Felix P. Camacho unveiled the *"2004 Guam Statistical Yearbook."* Prepared by the Bureau of Statistics and Plans, this yearbook marks the first of its kind comprehensive statistical report for Guam. This 450-plus page yearbook contains a compilation of social, economic, housing, and demographic data on Guam's development and progress over time. Students, researchers, and the general public can now have quick, hands-on access to current and historical data on topics such as housing and population, education, environment, vital statistics, labor force, income, the consumer price index, Chamorros in the United States, and election results. Also included in the yearbook are information on Guam's geography and climate; listing of political leaders past and present; comparative data between Guam and the island areas of the Commonwealth of the Northern Mariana Islands, American Samoa, and the Virgin Islands; glossary of terms; and Governor Felix Camacho's Inaugural and State of the Island Addresses.

With the release of this comprehensive sourcebook, our government, business and civic leaders will now be better equipped to develop immediate and long range plans to address our island's needs, generate investment, and provide incentives to stimulate Guam's economic growth and improve the quality of life for the people of Guam. The rich source of information contained in this report will provide our leaders with the tools necessary to effectively plan for a better tomorrow while addressing the needs our community today.

Since its release, over five hundred copies (including print and electronic format) have been distributed locally and circulated worldwide. Requests for the publication continue. The Bureau wishes to acknowledge the Government of Guam agencies, businesses, and civic organizations whose contributions in providing data have made this publication possible. The Bureau also wishes to acknowledge the Office of Insular Affairs, U.S. Department of Interior for providing technical assistance and support. The yearbook is currently available free to the public on compact disc at the Bureau of Statistics and Plans located at the Ricardo J. Bordallo Governor's Complex, Adelup.

Contact the Bureau of Statistics and Plans at 472-4201/2/3 for additional information.

Kid's Marine Fishing Derby

By: Nathaniel Martin

DAWR's Brent Tibbat measures a fish.

The Guam Department of Agriculture, Division of Aquatics and Wildlife Resources, Fisheries Section is mandated by law to promote and enforce Fish and Wildlife Game Laws. One of the programs used to promote aquatic environmental conservation is the annual Kid's Marine Fishing Derby. The purpose of the derby is to promote the use of the aquatic environment and at the same time encourage the environmentally sustainable fishing methods.

The derby is held at least 1 to 2 times a year. Summer months and regular vacation periods like November and July are the best times to do a derby. Kids ages 7-12 are allowed to join. All prizes given during the derby are donations from various local businesses. The derbies are normally scheduled on a weekend, which normally produces high tides, thus increasing the chances of having more fish available for catching at the selected fishing site.

A weekend before the derby kids are given the opportunity to attend a fishing clinic also run by the Guam Department of Agriculture. The purpose of the clinic is to teach kids who are planning to attend the derby how to fish, cast tie knots, and overall fishing safety and awareness. The derby is a catch and release event.

Photos by Mitch Warner

WATER SAFETY TIPS

Learn to Swim

Learn to swim. The best thing anyone can do to stay safe in and around the water is to learn to swim.

Always swim with a buddy; never swim alone. Swim in areas supervised by a lifeguard.

Follow the Rules

Read and obey all rules and posted signs.

Stay Informed

Be knowledgeable of the water environment you are in and its potential hazards, such as deep and shallow areas, currents, depth charges, obstructions and where the entry and exit points are located. The more informed you are, the more aware you will be of hazards and safe practices.

Pay attention to local weather conditions and forecasts. Stop swimming at the first indication of bad weather.

Check the surf conditions **before** you enter the water. Check to see if a warning flag is up or check with a lifeguard for water conditions, beach conditions, or any potential hazards.

Maintain Constant Supervision of Children

Never leave a child unobserved around water. Your eyes must be on the child at all times. Adult supervision is recommended.

Life Saving Equipment & First Aid

Always keep basic lifesaving equipment readily available and know how to use it. Pole, rope, and personal flotation devices (PFDs) are recommended.

Source: American Red Cross

Eco-Friendly Parade Appreciation

Governor Felix Camacho, Tony Sanchez, and Randy Sablan presented certificates of appreciation to several members of the Guam Chamber of Commerce for their support in the recycling project during the 61st Guam Liberation Day parade. Chamber members representing the Pacific Daily News, Guam Automobile Dealers Association, Guahan Waste Control dba Mr. Rubbishman, and Deloitte and Touche LLP presented $500 checks to the youth groups for monitoring the recycle bins at the parade.

Eric Braeden of Deloitte and Touche LLP, Governor Camacho, Tony Sanchez, and Ed Borja with the Chalan Pago Youth for World Youth Day.

Tom Mazzei of Guam Automobile Dealers Association, Governor Camacho, Tony Sanchez, Randy Sablan and Island Girl Power.

Bob Perron and Joey Lopez of Guahan Waste Control with Governor Camacho, Tony Sanchez, Randy Sablan, Mayor Melissa Savares, and the Santa Barbara parish altar servers.

Guam PDN publisher Lee Webber with Governor Camacho, Tony Sanchez, Randy Sablan, and the Hagåtña Youth for World Youth Day.

Photos by Roel Santiago

Recycling Guide

Be safe with hazardous waste.

Common household items such as paint, used oil, pesticides, batteries, cleaning products, solvents, and fluorescent light bulbs contain toxic chemicals. This **household hazardous waste** should not be thrown away with your regular trash. Contact the facilities listed here for safe disposal options or call Guam EPA to find out about upcoming free collection events and programs.

Consider the alternatives.

Look for opportunities to use less toxic products for common household cleaning tasks. For example, you can make **glass cleaner** by mixing 1 tablespoon vinegar or lemon juice in 1 quart of water. Spray on and use newspaper to wipe dry.

Reduce.

Source reduction is the first step to limiting the amount of waste we generate. By **preventing waste** before it starts, we can conserve resources, reduce pollution, and help cut waste disposal costs. Start by choosing products with less packaging or buying in bulk.

Reuse.

Consider **reusable products** instead of disposable items. Reuse bags on your next trip to the store, use empty glass jars to store leftovers, and sell or donate goods instead of throwing them out.

Recycle.

Start separating waste at home and at the office. Compost food scraps and green waste. Use the recycling guide to **take action** and encourage others to do the same.

For more tips, visit Guam EPA's What to Do With Household Hazardous Waste page at guamepa.govguam.net

Photo Courtesy of Elvie Tyler

Pacific Region Coral Reef Outreach Workshop: *Team Guam won outstanding educational video (Professor Kika Clearwater) and newsletter (Man, Land, & Sea) for the pacific region in a workshop hosted by the NOAA Coral Reef Conservation Program held in August at the Marriott Waikiki Resort in Hawaii. From left: Brian Day, instructor; Esther Gumataotao, GCMP; Elvie Tyler, GCC; Evangeline Lujan, GCMP; Peggy Denney, Guam EPA; Adrienne Loerzel, Governor's Office; Robin Abadia, instructor; and holding the fish is John Calvo of Western Pacific Regional Fishery Management Council.*

Micronesian Kingfisher

continued from page 8

Another issue plaguing the captive population is adult survivorship. Ninety percent of adults die before the age of four and nutrition is highly suspected. The zoos feed the sihek an artificial diet consisting of pinkie mice (rodents are not naturally found on Guam), crickets and mealworms, cat food, and anoles (most facilities do not feed anoles on a daily basis). Also, in some institutions, an artificial gecko is made using gelatin and a gecko-shaped cookie cutter.

Repatriating sihek to Guam has been a high priority as many of the zoological facilities are concerned that they are just unable to mimic Guam's natural environment (humidity, rainfall, etc) and food source. In September 2002, three males were sent to Guam's Department of Agriculture and in April 2004, the first female was repatriated. A pair was formed with this female and, this May, they began laying eggs. In July, the first sihek chick on Guam since the mid-1980s was hatched and was hand reared by the staff at the Wildlife Lab. The Department is expecting the arrival of two more females this September. Hopefully, returning these birds to their homeland is all that is needed to stabilize this fragile captive population of sihek.

Photo by Mitch Warner

Where do I take this stuff?

Some of these facilities will pay you, some will take your waste for free, and some will charge, depending on the type of waste. Facilities and services offered may change. Call the company for additional information.

Car and truck batteries:

Energy Recovery Corp.....472-2845

Island Scrap Yard.....637-1687

Joint Funding.....477-1669

Ko'Ku Recycling.....635-1123

Pacific Environmental Resources 565-7473

South Pacific Environmental.... 649-7609

Triple Star Recycling.....648-2910

Unitek Environmental..... 565-3151

Automobile waste oil, paint, thinner, pesticides, hazardous waste:

Energy Recovery Corp.....472-2845

Pacific Environmental Resources 565-7473

South Pacific Environmental.....649-7609

Unitek Environmental.....565-3151

Antifreeze:

Performance Auto Recycling....646-4910

Tires:

Ko'Ku Recycling.....635-1123

TW Recycling.....828-3028

Triple Star Recycling.....648-2910

Aluminum and other non-ferrous metals:

Aliron Far East LLC.....565-5553

Chin Chan Inc.....649-4074

Guahan Waste Recycling LLC..649-5183

Island Scrap Yard, Barrigada.....637-1687

Joint Funding.....477-1669

Ko'Ko Recycling.....635-1123

Pyramid Corp.....646-4474

Triple Star Recycling..... 648-2910

Ferrous metals:

Aliron Far East LLC.....565-5553

Island Scrap Yard.....637-1687

Ko'Ku Recycling.....635-1123

Triple Star Recycling.....648-2910

Cardboard:

Guahan Waste Recycling.....649-5183

Recycling Center of Guam.....646-4442

Office paper, pallets, green waste:

Ordot Dump.....472-2710

Computers:

Island Scrap Yard.....637-1687

TW Recycling.....828-3028

Triple Star Recycling.....648-2910

If your business or organization is not on this list and offers any of these services, call Guam EPA at 475-1658 or fax 477-9402 to be added in the list.

Kika's Kid Page

WORDSEARCH

P	S	T	A	R	F	I	S	H	R
A	R	C	A	M	E	R	A	E	L
R	H	O	G	U	A	M	T	L	N
H	S	I	F	A	H	A	E	I	K
C	S	D	N	E	W	H	H	S	R
O	A	I	R	R	S	P	W	U	K
R	N	V	A	U	L	S	J	N	I
A	D	E	R	O	Y	V	O	Z	K
L	L	F	D	C	R	A	B	R	A
C	B	A	L	A	T	E	B	O	B

BALATE BOB
CAMERA
CLEARWATER
CORAL
CRAB
DIVE
DOLPHIN
FISH
GUAM
KIKA
PROFESSOR
SAND
SHELL
STARFISH
SUN

Can you find all the words in the list?

What In The World Is This?

Scientific Name:
Halcyon cinnamomina
Common Name:
Micronesian Kingfisher

By: Suzanne Medina

The Mariana Island archipelago is home to two species of kingfishers. The collared kingfisher is found in the CNMI, where as Guam has Micronesian kingfishers. Guam's Micronesian kingfisher, or Sihek in Chamorro, is not found in the wild anymore as it has been driven close to extinction by the introduced, invasive brown tree snake

The sihek was saved from extinction when, in the mid-80s, 29 were brought into captivity to begin a captive breeding program. The last sihek was seen in the wild on Guam in 1988 and, because of lack of expertise and facilities on Guam, all sihek left the island to live in zoos in the U.S. mainland. Today, there are 65 sihek found in 12 zoos ranging from San Diego to Philadelphia and Orlando to Chicago. For the first few years of the captive breeding program, the sihek thrive and captive breeding appeared to come naturally for the birds. A few years later, however, with the second and third generation birds, breeding became increasingly difficult. Currently only 33% of chicks fledge the nest – 66% die or disappear for unknown reasons and cannibalism suspected. Because of this, almost all sihek in mainland zoos are hand-reared.

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Man Land & Sea Newsletter
Guam Coastal Management Program
Bureau of Statistics & Plans
P.O. Box 2950
Hagåtña, Guam 93932

MAN, LAND & SEA
News of Guam and Her Ocean Environment
APRIL MAY JUNE 2005 VOLUME XVI, NO. 2 • COMPLIMENTARY COPY

Island Pride Festival Sparks Awareness

By: Peggy Denney

Earth Week 2005, an Island Pride event with the theme "Don't Waste Guam's Future, was kicked off on April 23, 2005, with a "Na' La Bonita" cleanup on Route 4 from Agana to Talofofo. Organized by Department of Parks and Recreation, and assisted by volunteers from Americorps who helped monitor the separation of aluminum cans for recycling, the cleanup included all the Government of Guam agencies and public volunteers and was a highly successful event. There was also a Guam EPA-sponsored poster contest held for all the schools, and hundreds of posters were submitted. Twelve first prize winners were selected, along with 24 for Honorable Mention, and these posters were put up for display at GPO from April 16th through the 23rd. The posters were terrific and the participation by all entrants was truly appreciated.

Earth Week 2005 culminated with the Island Pride Festival held at Governor Joseph Flores Beach Park in Ypao on Saturday, April 30, 2005. The event was organized by the Environmental Education Subcommittee of the Guam Watershed Planning Committee, under the direction of Guam EPA, with a tremendous effort put forth by the Western Pacific Fisheries Regional Management Council, Guam Coastal Management Program, Dept. of Agriculture, Division of Aquatic & Wildlife Resources, Forestry Division, UOG Department of Natural & Applied Sciences and the Governor's Office.

The festival included 32 booths, both static and interactive, within the general themes of environmental education, artwork as well as other cultural arts and crafts, ornamental plants for landscaping, and, of course, food. Well before noon, the Guam EPA booth had given out more than 900 t-shirts to festival attendees who submitted a passbook stamped by 15 interactive booths, indicating they had participated in the booths' activities. Coincidently, participants wearing an Earth Day t-shirt also received free admission to the UnderWater World aquarium in Tumon. Other activities included a casting demonstration, relay races using recyclable materials, performances by several island dance troupes, a bird call identification contest, and the presentation of prizes for the poster contest, banner contest, the Green School Award, and the Environmental Stewardship Awards. The Green School

Continued on page 5...

Photo by Esther Gumatotao

This youngster tries her luck with the game "Find Kika a Home" at the Guam Coastal Management Program's booth. "Kika Clearwater" is the clown fish icon created by the Island Pride Committee for the marine environment.

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Man, Land, & Sea Newsletter
April May June 2005
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Editor
Esther Gumataotao

Bureau of Statistics and Plans
Anthony P. Sanchez
Director

Guam Coastal Management Program
Evangeline D. Lujan
Administrator

GCMP Staff
Raymond Caseres, Amelia De Leon, Francis L.G. Damian, Terry M. Perez, Esther Gumataotao, Victor Torres, and Timothy Semuda

NOAA Pacific Islands Assistants
Dave Burdick and John Tomczuk

Subscription Information
To subscribe to the Man, Land, & Sea Newsletter, please contact:
Evangeline Lujan
Man, Land, & Sea Newsletter
Guam Coastal Mgmt. Program
Bureau of Statistics and Plans
PO Box 2950
Hagåtña, Guam 93932

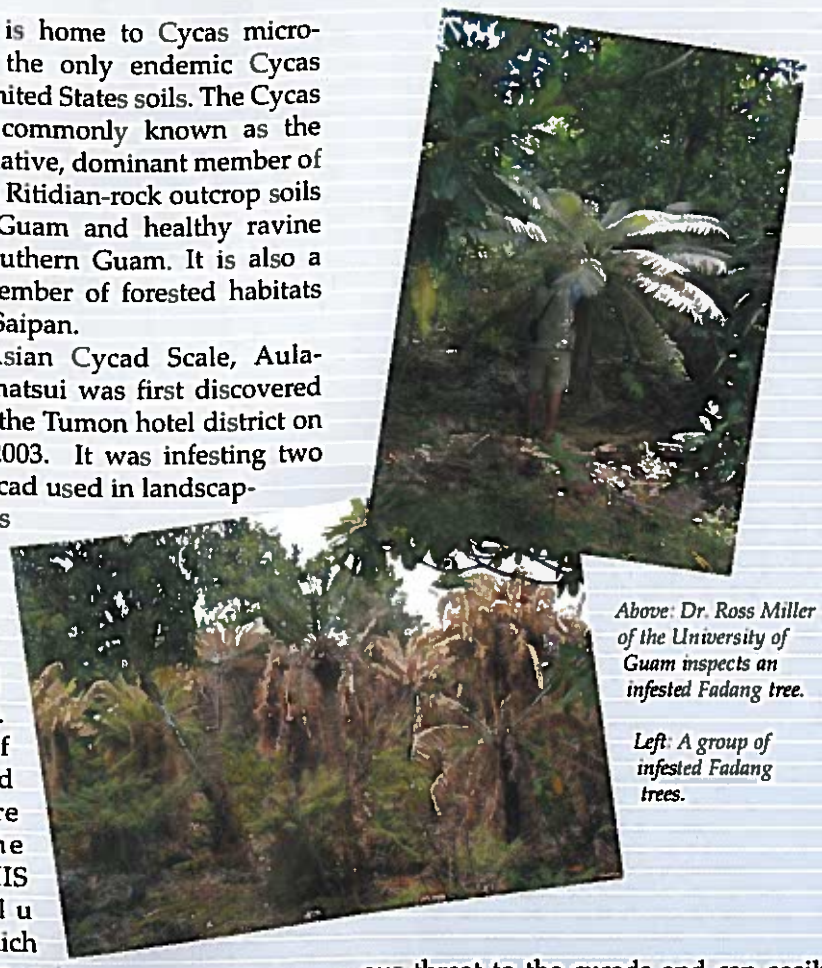
Phone: (671) 472-4201-3
Fax: (671) 477-1812
Email: vange@mail.gov.gu

The Man, Land & Sea Newsletter is funded by a grant from the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) through the Coastal Zone Management Act of 1972, as amended, administered by the Office of Ocean and Coastal Resource Management Program (OCRM) and the Guam Coastal Management Program (GCMP) of the Bureau of Statistics and Plans (BPS), Government of Guam, through Grant Number NA17OZ2332.

Asian Scale Threatens Fadang's Existence

Guam is home to Cycas micronesica Hill, the only endemic Cycas species on United States soils. The Cycas micronesica commonly known as the Fadang is a native, dominant member of all forests on Ritidian-rock outcrop soils throughout Guam and healthy ravine forests in southern Guam. It is also a dominant member of forested habitats in Rota and Saipan.

The Asian Cycad Scale, Aulacaspis yasumatsui was first discovered on Guam in the Tumon hotel district on October of 2003. It was infesting two species of cycad used in landscaping – Cycas revoluta, commonly known as the Sago palm and the Fadang. Samples of infested fronds were sent to the USDA-APHIS Honolulu office in which Thomas Watanabe identified the Asian Cycad Scale. The population of this alien pest spread rapidly throughout the island; and initial surveys in February 2004 indicated that landscapes in Tumon Bay and Barrigada Heights were heavily infested. In March, it was found in forest habitats south of Tumon Bay, that by April, Fadang plants were beginning to die from the scale even in managed landscapes. Sago palm plants in Tumon Bay were also turning brown and beginning to die in June. By July the scales were found on Sago palms throughout the entire northern Guam. The initial Fadang plant deaths in habitat were documented in August. These are the first documented deaths of any cycad in native habitat worldwide caused by an alien insect. The epidemic poses a serious threat to the cycads and can easily change Guam's characteristic features, and natural forests. Without intervention, Fadang plants have less than one year to live after the initial infestation.



Above: Dr. Ross Miller of the University of Guam inspects an infested Fadang tree.

Left: A group of infested Fadang trees.

The Department of Agriculture's Division of Forestry and Soil Resources is working with the Dr. Thomas Marler and Dr. Aubrey Moore of the University of Guam to control the pests and save the plants. They have proposed a research trial to evaluate the feasibility of using insecticides as an emergency treatment for the Fadang in order to prevent cycad mortality on Guam's forested lands.

Biological control methods have been initiated to counter the scales. Predatory beetles have already been

Continued on page 6...

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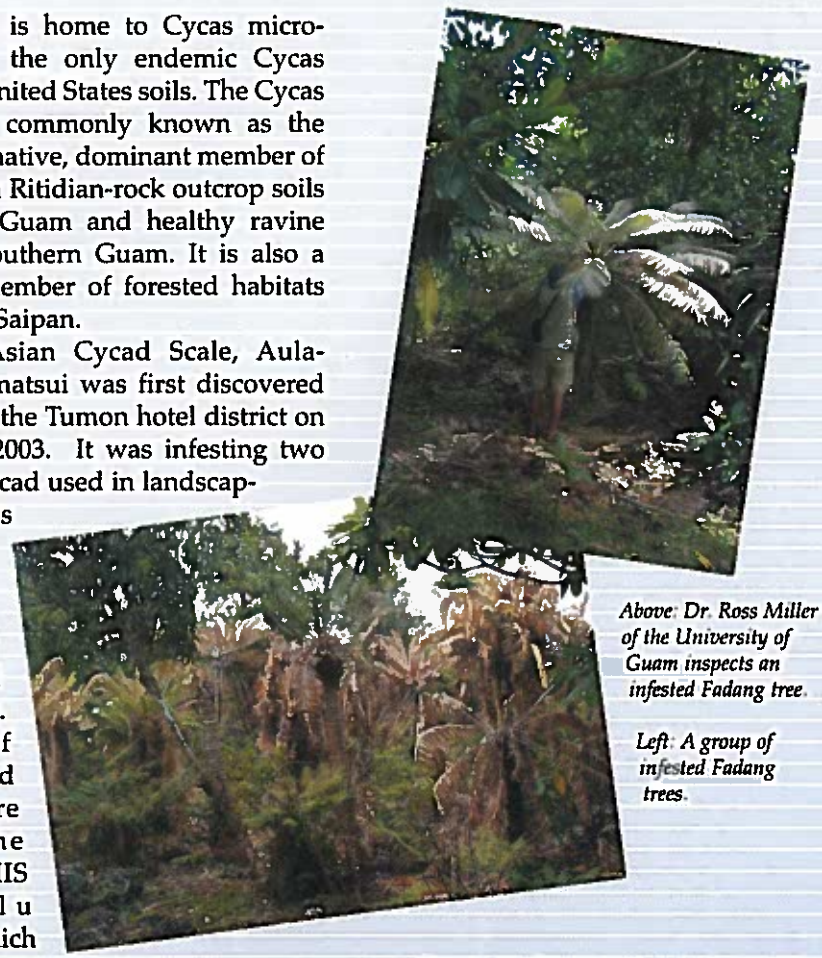

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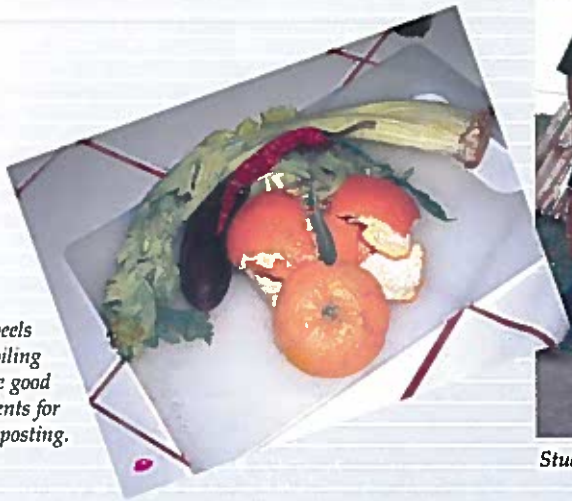
Backyard Composting
Recycling Our Organic Waste

By: Peggy Denney



Fruit peels and spoiling vegetables are good ingredients for composting.

Students from the Dededo summer sports camp pose with Peggy Denny by a composting bin.

As concern for the health of our island and our environment increases and as our awareness of these issues is heightened, many of us are now employing the three Rs of conservation. We **recycle** aluminum cans, we **reuse** paper as scratch paper and line trashcans with plastic grocery bags, and we **reduce** energy consumption through conservation measures. If we apply the three Rs to our yard trimmings, kitchen scraps and leftover food, we have composting. Simply put, composting is an economical method of reducing solid waste, reusing organic materials, and recycling nutrients as a soil conditioner. Composting is easy – and it's the right thing to do. By doing so, we become better caretakers of our environment.

COMPOST "INGREDIENTS"

"Browns" are dry, carbon-rich organic materials.
Examples are:
dry leaves • straw/hay • wood chips • saw dust • napkins • dryer lint • newspaper • vacuum cleanings

"Greens" are fresh, moist, nitrogen-rich materials.
Examples are:
grass cuttings • fruit and vegetable peelings or scraps • tea bags • pasta • coffee grounds • stale bread • eggshells

It is generally estimated that yard waste and household food waste comprise approximately 20% of the waste stream going into landfills. If we could begin composting these items, we could significantly reduce the amount of waste now going into the Ordot dump. Composting is a process by which organic materials, such as tree/shrub branches and leaves, fruit, and kitchen scraps, biologically decompose under controlled conditions. It is basically the result of humans imitating nature's disposal system. Rapid, trouble-free composting requires a balance of five essential ingredients. If a compost pile is maintained with the proper balance of moisture, air, carbon and nitrogen, then the decomposing organisms – insects, worms, bacteria, fungi, and actinomycetes, will do the rest.

Beginning with water, all living things require water, even the decomposers. The compost pile should be moist but not wet – similar to a damp sponge. Oxygen is essential to most decomposers and it cannot circulate if the pile is too dense, too large, or too wet. Carbon is abundant in most organic materials and is broken down by de-composers to create food-energy. These are materials like wood chips, sawdust, and paper, and are often referred to as the "brown" ingredients. Nitrogen is required by decomposers in fairly large quantities and aids in the digestion by decomposers of carbon-rich materials. These are the "green" materials and include, among others, green leaves, grass clippings, and kitchen scraps. The decomposing organisms generate heat as they break down the various materials, and an active, or "hot" compost pile will reach temperatures of 120 - 160°F. Such temperatures can effectively kill weed seeds and many pathogens (disease organisms).

To begin composting, select a level site at a convenient location in your yard (close to a vegetable or flower garden, for exam-

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Water on Ancient Guam

By: Anthony P. Sanchez

Water is a basic need. The Chamorro word for water is "*hanum.*" Unlike atolls, the Marianas in particular is blessed with an abundance of fresh water, mostly groundwater. This is due to the porous rock of lava and dead reef which the islands are made from. Guam has the largest source of groundwater in the Western Pacific.

On Guam there is no river north of Agana. Yet there were large settlements of ancient villages in the north. Most were situated near caves or springs which they called "bo'bo." The source for Fena reservoir, Guam's man-made lake, is actually a bo'bo. Taragüe, Urunao, Hanum, and other ancient sites have caves and porous rock from which freshwater flows out. Ypao beach has such a natural bo'bo flowing right on the beach near the Hilton side.

Water availability created different problems in pre-contact, Spanish, early American and recent times. During the Spanish, the concern centered around their five villages and the ranches.

Spain's Governor Garcia (1884-87) cites 30 rivers, streams and seasonal ravines down south in his *Random Notes* as translated by Marjorie Driver. From it we get a glimpse of how water determined where people stayed and what they had to go through to obtain it in Spanish times.

"Frequently, heavy rains are responsible for a continuous filtration that gives origin beneath an elevated compacted terrain to many small rivers and streams on the Southern half of the island of Gudjan.

The main source of small Agana river is a spring in a marshy area known as the cienega (swamp) to the east of the city. The stream runs parallel to the sea along the north side of the town through a canal or trench that was dug by orders of Governor don Francisco Villalobos (sic).

The people use the stream for bathing and washing. They do not use it for drinking because it is blackish and cloudy. Much better drinking water is obtained from many of the wells they have dug at home.

The following streams exist along the way from Agana to Apra Harbor: the small Pigo river, two kilometers from Agana; the Asan, more than four kilometers distant; the Margui, more than five; and the Mazo, about eight. (Before reaching the barrio of Asan, there are two additional riverbed and ravines and three between Margui and Mazo.) The four small rivers flow slowly all year, like the streams of Sada, Aguada, and Atantano that empty into Apra Harbor. The mouth of the Alluja stream is at the entrance to the pueblo of Agat. Streams that empty between there and the pueblo of Umatac are the Finili, Talaifac, Ja, the Umatac, and other smaller seasonal streams. The Tonguan and the Vilic, streams with little water but constant flow, are between Umatac and the pueblo of Merizo. Between Merizo and Inarajan are found the Paparaguan, Jajayan, and Acfallan which are permanent streams with little water; seasonal streams are the Maneno, Sumay, Liyu, Tongan, and Achu. From Inarajan to Pago are found the Inarajan, Alonso, Tarafofo, Toccha, Ilic, and the Pago, all permanent streams with varying amounts of water. Only the Tarafofo, however, can be called a river. All streams mentioned can be used for irrigation and to provide drinking water, even to the interior of the island.

In the northern half of the island, the waters filter and disappear almost completely. Therefore, there are only a few springs along the coast in addition to several seasonal wells and ponds. Consequently, water is very scarce on the Santa Rosa Plateau. Sometimes the ranchers must travel three or four leagues to fetch it: those from the plateaus' southern end and central valley carry water from Agana bamboo containers."

Water in Spanish Guam, like today was a source of great concern when it came to health. In 1891, Governor delos Santos cites it as the cause of one of the more harmful disease for children.

"Among older children, it is intestinal worms, or lombrices. It is believed that the principal culprit, which introduces them into the digestive track, is the brackish well-water that most of the inhabitants of the coastal pueblos drink. In order to correct this serious problem and save 50% of the children infected with intestinal worms from death, as well as to improve the health and sanitary conditions in general, there is under study a project to bring water from the Fonte arroyo. It would tap the water close to the source, on the lower east side of Mount Libugon (now Nimitz Hill), at some 79 meters of elevation above the level of Agana and at a distance of 4,000 meters, which is the distance that would have to be covered by conduits. For this experiment, the conduits for the water would be made of cafo' (pandanus) pipes mounted on posts constructed from coconut tree trunks. It is believed these materials, used for this purpose, could last about two years.

Also pending is the very important study of the improvement project that would bring water to Agana from the Fonte arroyo, a distance of 4,000 kilometers. Once the results produced by the experiment, which will utilize vertical supports made from coconut trunks and conduits made of cafo' (as stated elsewhere) are known, it will be possible to propose to the Superioridad the work required to finalize it as a permanent fixture that will utilize iron pipes."

111 years later water related health problems still concern a larger and more modern Guam. Some things that should, just never seem to change.

Island Pride Festival Sparks Awareness

Continued from page 1...

Award was given to St. John's School for their environmental projects, which included planting 1,000 trees at various locations around the island as well as other cleanup activities. The Environmental Stewardship Awards were selected from nominations submitted by the public for the individual, organization and business on Guam who most reflected environmental stewardship in their endeavors. The award for individual stewardship went out to two nominees, Melissa Savares, the Mayor of Dededo, and Melen Ruiz. The recipient for the organization went to GW's Linda Tatreau and Marine Mania, and the business award was given to the Westin Hotel.

The turnout for this year's Earth Week/Island Pride Festival was truly remarkable. It was estimated that more than 2,000 people attended, which represents a significant improvement over the several hundred in attendance last year. One can only hope that this is a reflection of an increased awareness of and interest in environmental issues island-wide. We thank everyone who was involved in event for their hard work and dedication, and we thank all those who attended the festival for making it such a resounding success!

Backyard Composting - Recycling Our Organic Waste

Continued from page 3...

ple). A basic compost heap or pile can be used, although many people prefer some type of bin to keep out pets and pests. Collect your materials to be composted. A good rule of thumb is to have a ratio of approximately 2 : 1 "browns" to "greens." Refer to the insets for items that can be composted. Try to chop or shred all the larger materials so that you have a smaller particle size in order to accelerate the composting process. Dampen all materials as you place them in your pile or bin, and mix well. You should strive for a volume of about 27 cubic feet or a pile size of 3' x 3'x 3'. These dimensions will create a pile large enough to generate the necessary heat to promote active composting, destroy pathogens, and kill weed seeds. After a week or two, mix the compost pile again, making sure that the materials on the outside are moved into the center of the pile where the temperature is the greatest. This will promote the rapid breakdown of all your composting materials.

As the process continues, you will see the volume of your pile decreasing, and over the next six to eight weeks, mixing every week or two, the materials will change into a dark, crumbly, soil-like end product called humus. Let this material "cure" for a couple weeks to create a stable product that can then be incorporated into your vegetable or flower garden, used as a potting mix for your potted plants, or added to soil as a soil amendment. Using compost in any of these methods increases organic matter content, increases water-holding capacity, and increases porosity, which provides for better aeration and promotes root growth. As you continue to compost and use the compost in your gardening efforts, you will be amazed at and thrilled with the tremendous benefits composting affords to those who strive to become better stewards of our island's resources.

Cultural exhibits included this coconut grater carved out of ifit wood. Ifit is Guam's national tree.

Visitors attempt to create lava.

GCMP's Francis Damian demonstrates his volcanic experiment.

Asian Pest Threatens Fadang's Existence

Continued from page 2...

released in the northern area. However, according to Dr. Moore, this method may not be enough to effectively prevent Fadang plant deaths. Two types of insecticides, DISTANCE IGR and Imicide will be evaluated for use on the plants. DISTANCE IGR, is an insect growth regulator applied as a foliar spray. It is currently being used on Guam for controlling Asian cycad scales on ornamental cycads. Imicide, is applied as a trunk injection. According to Dr. Moore, this product has never been used on Guam; and it may be well suited for forestry because Imicide is applied using a closed system to inject small amounts directly into the Cycad trunks, none will be lost from spray drift or carried away by rain water.

Source: Dave Limtiaco
Chief of Forestry and Soil Resources
Department of Agriculture

Dr. Aubrey Moore
Entomologist
College of Natural & Applied Sciences
University of Guam

Close up of Asian cycad scales.

Extreme close-up of Asian cycad scales, showing mature females, immature males, and crawlers.

Asian Cycad Scale

Continued from page 8...

These sedentary insects feed by sucking sap out of plants. As the name suggests, the cycad scale feeds only on cycads.

Infestations start on the undersides of cycad leaflets, spreading rapidly to the upper surfaces of the leaflets, the trunk, and all other external parts of the plant including the roots. Severely infested cycads look as if they have been sprayed with white paint. Upon closer examination, you will see that the plant is covered with large numbers of scales covered by a white waxy secretion. Mature females are circular with a diameter of about 1/16 inch. Immature males, which usually outnumber the females, are much smaller and elongate, looking like miniature grains of rice. You may also see adult males, which are orange-brown and are similar in appearance to tiny flying midges with one pair of wings and well-developed legs and antennae.

Females lay eggs under their waxy covers. Active crawlers, which are almost microscopic, hatch from these eggs. Crawlers are dispersed by the wind and may infest plants more than a mile away. Crawlers may also disperse by hitch-hiking on animals, clothing, or vehicles.

Control Recommendations. Cut off all severely infested leaves and dispose of them immediately by burning or burial to prevent crawlers from being dispersed to other plants by the wind. Do not transport infested leaves in an open vehicle.

You will need to protect your plant from reinfestation as new foliage emerges. The Asian cycad scale can be controlled with weekly application of light horticultural oil such as Ultra-Fine Oil. For a longer-lasting treatment, apply a systemic insecticide such as those containing acephate (Ortho Systemic Insect Killer). Professional pest managers have had excellent success with the insect growth regulator, pyriproxyfen, sold as Distance IGR. However, this product is too expensive for most home-owners.

Insecticidal control may provide a short-term solution for protecting landscaping plants, but this is probably not an option for protecting wild cycads.

Natural enemies. It may be possible to achieve sustainable control of cycad scale on Guam by introduction of biocontrol agents which target this pest.

In Hawaii, *A. yasumatsui* populations are controlled to some extent by a tiny black lady beetle, *Rhyzobius lophanthae*, which was introduced in 1894 as a biological control agent for other scales insects. There were two unsuccessful attempts to introduce *R. lophanthae* into the Mariana Islands in 1925 and 1926. Laboratory colonies of this beetle were established at the University of Guam from adults collected on Maui in 2005. *R. lophanthae* is being released on Guam and is already numerous at two release sites. However, this biocontrol agent may not eat enough scales to prevent cycad mortality during the severe infestation we are currently experiencing. University of Guam entomologists are planning to import and release additional biocontrol agents to mitigate damage to wild endemic cycads, *Cycas micronesica*.

more of Earth Week 2005...

1. Marine Mania's Winning Banner **2.** Banner Painting Contest **3.** Woven Palm Basket **4.** GCMP Staff & BSP Director Tony Sanchez **5.** John Tomczuk and friend **6.** Alejandro Acosta **7.** DAWR's Neil Martin and Visitor **8.** Dave Burdick and Kika Clearwater game **9.** GCMP's Amelia De Leon creates lava **10.** Environmental winners

What In The World Is This?

Cycad plant being killed by an infestation of cycad scale.

Scientific Name:
Homoptera:Diaspididae
Common Name:
Asian Cycad Scale, Aulacaspis yasumatsui

By: Dr. Aubrey Moore, Ilene Iriarte, and Roland Quitugua

Introduction. The Asian cycad scale, *Aulacaspis yasumatsui*, also known as the sago palm scale, was first detected on Guam in the Tumon hotel district during the last quarter of 2003. Several sago palms, *Cycas revoluta*, and endemic cycads (fadang), *Cycas micronesica* were heavily infested.

The Asian cycad scale is native to Thailand and southern China. It was accidentally introduced into Florida through the legal importation of cycads by a botanical garden (McLaughlin 1998). The scale may also have been introduced into Hawaii from Florida in 1998. It is likely that *A. yasumatsui* arrived on Guam on cycads imported from Hawaii.

The cycad scale has become a major pest throughout Guam, attacking cycads used for landscaping and the endemic *Cycas micronesica* which is a major component of Guam's flora. The leaves of infested cycads have a whitewashed appearance. Continuous feeding by large numbers of scales removes sap from the leaves and they turn brown. If left untreated, infested cycads usually die within one year.

Description. The cycad scale is a tiny insect which belongs to Diaspididae, the family of armored scale insects.

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Man Land & Sea Newsletter
Guam Coastal Management Program
Bureau of Statistics & Plans
P.O. Box 2950
Hagåtña, Guam 93932

MAN, LAND & SEA
News of Guam and Her Ocean Environment
JANUARY FEBRUARY MARCH 2005 VOLUME XVI, NO. 1 • COMPLIMENTARY COPY

Coral Reef Workshop Receives Positive Reviews

Governor Felix P. Camacho asks Notre Dame High School student Clarissa Damian to present her thoughts on Guam's environment.

The Coral Reef Protection Workshop attended by representatives from the private sector, local and federal governments, the military and youth environmental clubs was well received.

In conjunction with Department of Agriculture Division of Aquatics and Wildlife Resource (DAWR), the Bureau of Statistics and Plans Guam Coastal Management Program hosted the workshop with the intent to guide marine water recreational users on the impacts of recreational use on Guam's coral reefs and increase the number of informed individuals in the field to understand how to protect the reefs while still enjoying the resources.

Vice Speaker Joanne Brown was pleased to see the youth and other groups' compassion for the environment. She applauded and encouraged everyone present to become stewards for the environment and stated that Guam is our island; we must protect its natural resources not just for the people of Guam but for future generations.

In recognizing the importance of preserving and protecting the coral reefs, participants suggested other means of getting the message out to the public. One way was to advertise on print and televised media.

In addition to the workshop, students from George Washington High School's Marine Mania, Academy of Our Lady, and Notre Dame High School participated in a roundtable discussion with Governor Felix P. Camacho on becoming environmental stewards.

As a result, relationships were formed and several groups expressed interest in a partnership with the Guam Coastal Management Program to create awareness within the community. Gerard Aflague expressed, "great turn out and excellent job planning and executing a wonderful and beneficial seminar all-around. I look forward to working with you on the education leg of the effort in partnership with the U.S. Coast Guard Sea Partners Program."

The workshop was held at the Guam Hilton Resort and Spa in the Micronesian Ballroom on Monday, March 28, 2005 and Tuesday, March 29, 2005. Tuesday's workshop was held in the evening to accommodate recreational users who worked during the day.

To learn more about Guam's Recreational Overuse and Misuse action strategy, please contact Victor Torres, GIS Manager, John Tomczuk, or Dave Burdick at 475-9665.

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Man, Land, & Sea Newsletter
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Editor
Esther Gumataotao

Bureau of Statistics and Plans
Anthony P. Sanchez
Director

Guam Coastal Management Program
Evangeline D. Lujan
Administrator

GCMP Staff
Raymond Caseres, Amelia De Leon, Francis L.G. Damian, Terry M. Perez, Esther Gumataotao, Victor Torres, and Timothy Semuda

NOAA Pacific Islands Assistants
Dave Burdick and John Tomczuk

Subscription Information
To subscribe to the Man, Land, & Sea Newsletter, please contact:
Evangeline Lujan
Man, Land, & Sea Newsletter
Guam Coastal Mgmt. Program
Bureau of Statistics and Plans
PO Box 2950
Hagåtña, Guam 93932

Phone: (671) 472-4201-3
Fax: (671) 477-1812
Email: vange@mail.gov.gu

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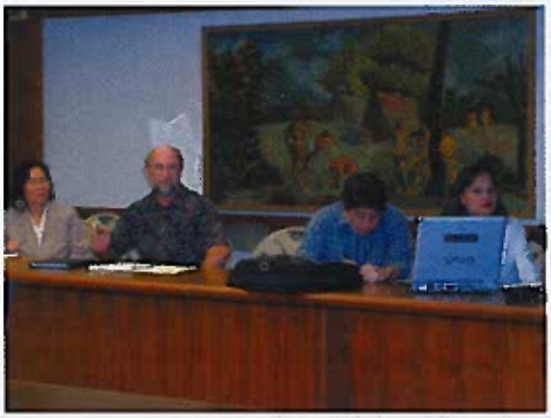
GIS Technology In The Workshop



Participants listen as Dave Burdick conducts training.

In an effort to enhance the island's spatial technology capacity, weekly training sessions have been offered to GovGuam employees and other interested parties since March of 2004. The training sessions, conducted by Dave Burdick, focus primarily on Geographic Information Systems (GIS), but also address related spatial technologies such as the Global Positioning System (GPS) and remotely sensed data (e.g. satellite and aerial imagery). See sidebar for information about Geographic Information Systems, or GIS. Each training session provides an opportunity to discuss GIS-related problems people may be encountering, offer new applications of GIS, and provide demonstrations of a wide array of skills. The sessions also provide a regular opportunity for Guam's GIS users to interact with one another, discuss current projects, share data, and learn from one another. Attending the training sessions does not result in a certificate or degree, however, and the weekly training should be considered supplemental to more formal training opportunities, such as online courses, training brought to the island by NOAA instructors, and courses that will soon be offered by Dr. Yuming Wen at the University of Guam.

The instructor of the weekly GIS training sessions, Dave Burdick, is part of the National Oceanic and Atmospheric Administration's (NOAA) Pacific Islands Assistantship Program. The Pacific Islands Assistantship Program, which began in 2001, places recent recipients of professional degrees in Hawai'i, Guam, the CNMI, and American Samoa. Each assistant serves their state's/territory's coastal management community for two years and is then replaced by a new assistant. Dave arrived on Guam in January 2004 and will remain on island until January 2006. Although the responsibilities of each assistant vary depending on the needs of each coastal management program, the general goal is to build spatial technology capacity within (and often beyond) the coastal resources management community. This may include providing GIS training, assisting with various research or monitoring projects involving spatial technologies (e.g. coral reef mapping and shoreline erosion monitoring), and improving the quality and quantity of spatial data available to the island's GIS users.

A typical training session involves a step-by-step demonstration of a particular skill or set of skills. Environmental Systems Research Institute's (ESRI's) ArcGIS 8.x and 9.0 software is used for the training. The participants are encouraged to bring their own notebook computers with ArcGIS 8.x or ArcGIS 9.0 software installed so that they are able to follow along with the demonstration. Several new computers with GIS software may soon become available for use during the training sessions, which will allow those presently without these resources the opportunity to gain hands-on experience using GIS. The training sessions are open to GIS users of all experience levels, including those with no experience. Because new participants with little experience are often present, skills are reviewed regularly – and even

Continued on page 7...

Land Use Planning Underway

By: Raymond Caseres

Division of Aquatics and Wildlife Resources Chief Tino Aguon and Joe Borja, Director of Department of Land Management identify commercial, residential, agricultural, & conservation areas on a map.

GCMP Administrator Evangeline Lujan and Capt. David Boone, Commander U.S. Navy Region Marianas exchange ideas for updating Guam's Land Use Master Plan.

On a blank map, participants identified residential, agricultural, commercial, industrial, historical, and conservation areas.

David Craddick, GWA General Manager brainstorms with his group in defining Land Use Planning. To his right is Frank Limtiaco, GHURA Planner and Nora Camacho, Land Use Planner for Hagatna Restoration and Redevelopment Authority.

Since the creation of the Land Use Master Plan for the Territory of Guam in 1966, there has not been an update within the past thirty-nine (39) years. Although there were several attempts to update this plan in 1977, 1978, and 1984 and the "I Tano'ta Land Use Plan," many of the plans and recommendations were never implemented. The Bureau of Statistics and Plans Guam Coastal Management Program has taken the lead to develop goals and objectives, and a mission statement by collaborating with local officials and the military. February 25th 2005, marked the beginning of a three-part series of working sessions to identify core elements of land use planning, which will serve as a guide for the development of the strategic plan. Participants in the first working session were divided into groups and asked to define land use planning. Here are what some of the groups came up with:

"Provide direction to balanced development, to ensure quality of life is maintained, the environment is preserved, and the economy can be sustained."

"Collaborating with network agencies and community to ensure land use development is environmentally and socially sound, and in compliance with existing laws."

"Land use planning is the art of coordinating the development of the best ways to use land for the future. Taking into account the human, social, economical, and environmental impacts (short and long term) on our natural resources."

"Planning for SMART community development by guiding timing, placement, type of land use: Sustainable development, Manageable, Attainable, Resource protected, Team approach."

After presenting their definitions, the groups all recognized that sustainable development, environmental, social and economic impacts were common themes and need to be addressed for the land use plan update. The second session involved individuals from the military and private sectors. Captain David Boone, Commander for the U.S. Navy Region

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Nature Conservancy: Preserving Great Places

Trina Leberer of The Nature Conservancy enjoys Guam's marine environment.

The Nature Conservancy (TNC) is a non-governmental organization (NGO), whose mission is to preserve the plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. Founded in 1951 in the U.S., TNC now works in 28 countries and employs over 3,000 full-time staff at more than 400 offices around the world. TNC partners with governments, businesses, and communities to achieve lasting conservation goals. TNC conducts science-based work in a non-confrontational and collaborative way, employing an approach called "Conservation by Design", which incorporates an iterative process of setting priorities, developing strategies, taking action, and measuring success.

Since 1990, TNC has worked closely with local, national, and regional partners to protect some of the Asia-Pacific region's most diverse and threatened natural resources. From a modest beginning in the Republic of Palau, TNC has grown to support conservation projects and programs in the Federated States of Micronesia (FSM), Papua New Guinea, the Solomon Islands, Indonesia, Australia, and China.

In 2002, TNC expanded its Micronesia Program to include the Northern Mariana Islands, Guam, and the Marshall Islands. Current work in Micronesia includes: the drafting of ecoregional plans for FSM and Palau, with future plans to prepare ecoregional plans for the Mariana and Marshall Islands, respectively; training local teams in conservation area planning; and expanding partnerships throughout the region. New partnership initiatives include the Micronesians in Island Conservation (MIC) peer-learning network. Its purpose is to leverage the conservation work in Micronesia by increasing the success, effectiveness, and number of conservation leaders in the nonprofit and government sectors. TNC has also been instrumental in helping to establish or expand local NGOs in the region, such as the Palau Conservation Society, the Conservation Society of Pohnpei, the Kosrae Conservation and Safety Organization, and the Yap Community Action Program.

One of TNC's main areas of focus is sustainable financing for conservation. In 2002, TNC assisted with the launch of the Micronesia Conservation Trust (MCT). The MCT was recently chosen to manage the new Global Environment Facility (GEF) Sub-regional Micronesia Small Grants Program serving Palau, FSM, and the Marshall Islands. With the formal agreements signed, the MIC leaders are now working to outline next steps for implementation. This long-term program will support community projects addressing the GEF focal areas (biodiversity conservation, climate change, international waters, persistent organic pollutants, and land degradation). The Micronesian fund will start with a focus on supporting the National Biodiversity Strategy and Action Plan (NBSAP) activities. TNC was also instrumental in developing the Compact II Environment Sector Strategic Plan, which has resulted in about $2 million per year through 2024 for the governments of the FSM and the Marshall Islands.

Future goals for TNC in the region include: assisting in the establishment of national Protected Areas Networks by 2012; fostering strong local partners in Guam and CNMI; and securing sustained, reliable funding for these efforts, including an endowment of $20 million for the MCT by 2020.

As part of TNC's expansion in the region, Trina Leberer was hired as the Marine Conservation Coordinator for the Micronesia Program in October 2004. Prior to joining TNC, Trina worked at the Division of Aquatic and Wildlife Resources for nearly 7 years in various capacities, most recently as the Acting Chief. In her new capacity as Marine Conservation Coordinator, she assists partners in their marine conservation efforts in Palau, FSM, the Marshall Islands, the Northern Mariana Islands, and Guam. She will work closely with in-country and regional partners, such as local governments, NGOs, community partners, federal

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Maritime Teamwork Triumphs

The Maritime Interdiction Task Force (MITF) of the Customs and Quarantine Agency of Guam received $377,000.00 from the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA/Fisheries) – Office for Law Enforcement (OLE), through a Joint Enforcement Agreement (JEA) for the furtherance of its law enforcement operations and the purchase of a new patrol boat for the Fiscal Year 2005.

In an initial agreement between Guam Customs and Quarantine Agency and NOAA Fisheries, MITF provided a full time Task Force Agent to NOAA/Fisheries law enforcement office in Guam. The combined team work made investigations and joint operations successful, to include the arrest of four individuals on two separate turtle poaching cases – the most by any NOAA/Fisheries OLE field office in the country, according to a press release from Guam Customs and Quarantine Agency.

On September 9, 2004, two foreign commercial fishermen pled guilty to federal violations of the federal natural resource anti-trafficking law, the Lacey Act and the Shark Finning Prohibition Act. "This is the first United States arrest, charge, and conviction since the shark finning ban was implemented in 2002. We are proud to say we made history with these arrests and convictions here on Guam. This Joint Enforcement Agreement is an excellent example of what can be accomplished when agencies focus on the task at hand and work together," said Colonel Ricardo Blas, Acting Director for Customs and Quarantine.

Bureau of Statistics and Plans Welcomes New Employees

Ashley Nauta
Secretary

The Bureau welcomes Ashley Nauta as the Director's secretary. She will be working directly with Anthony P. Sanchez in moving forward the agency's initiatives. Prior to her coming to BSP, Ashley worked for the Camacho/Moylan administration. She brings a couple years of administrative experience to the Bureau.

Ashley's computer skills in Microsoft Word, Excel, Outlook Express and PowerPoint have been beneficial to the Bureau.

She is a graduate of the class of 2002 from Trinity Christian High School.

Land Use Planning Underway

Continued from page 3...

Marianas, presented planning efforts of the U.S. Navy Marianas Region and future growth and development within the next few years. According to Capt. Boone's presentation a master plan is needed primarily because resources are scarce, it ensures compatibility between different industries and activities, and more importantly, there is a need to make decisions that benefit the whole and not a few. In this phase, the participants were again placed in groups and were asked to reflect on the uniqueness of Guam, foresee an ideal Guam in the next 20 years, and implement strategies in carrying out that vision.

March 29, 2005 marked the third working session in updating Guam's Land Use Master Plan. Again, groups formed and created a mission statement based on the common themes from the last two sessions. Here is an example of one mission statement:

"Guam's Land Use Plan guides collaborative efforts to determine the best use of the available environment and resources, for the purpose of enhancing the quality and of our community and diversity of our economy in a sustainable way that ensures positive socio-economic impacts and allows for periodic evaluation."

Finally, the group set realistic goals achievable within the next 12 months and decided that the collection of data was crucial in updating the master plan. More sessions in implementing an update to the land use plan are scheduled to identify key groups or individuals in the community who will assist in bringing the plan to fruition.

Fouha and Fu'una Guam's Cradle of Man's Creation

By: Anthony P. Sanchez

That Magellan landed in Umatac in 1521 is appropriate. The area has had a significant role in Chamorro history and legend long before the Spanish came.

Less than a mile to the North of Umatac is "Fouha" bay, Guam's cradle of creation when translated means "to spew." Fouha and the surrounding area was the center of the spring running of guatafi (a type of fish). The month of March in Chamorro is Umatalaf ("to catch guatafi") is believed to be the root word of Umatac, our southern village.

Each March equinox (March 20th) our ancestors held a spring festival at "Fuuna" Rock, a large circular rock phalanx which protrudes from the reef straight up for some thirty feet just off the shore at the entrance of Fouha bay.

Fuuna is the name given to Fouha bay on the early Spanish maps is a large and important village. The rock at the entrance of Fouha bay is called "Funa Rock" which plays into our next legend of how man was created.

As told in "Legends of Guam" (published 1988 by Chamorro Studies of DOE as researched by Olympia Q. Camacho), the origin of man from the Chamoro is summarized herein.

"In ages past there was once a god named Chaifi (guaifi means fire) who lived in Sasalaguan (readily translated as hell – where people who died violent deaths went). There he made souls and used them as slaves. One day Chaifi built a very large fire in an open pit which suddenly exploded. In the confusion, one of the souls escaped from Sasalaguan and landed on the southern part of Guam. It turned into rock which softened as the rain fell, transforming into a man. According to legend, the remnants of this rock is Funa Rock.

After exploring the island, he found he didn't like to be alone. So he decided to make some companions for himself. Gathering up some red earth and some water he formed it into the shape of a man. He used the heat of the sun to give it a soul. He made both men and women and called them children of the earth.

Meanwhile, Chaifi, having controlled the fire in Sasalaguan, checked his remaining souls and discovered one had escaped. After searching many days, he noticed a small child playing on the beach. Thinking it to be his lost soul, Chaifi sent in a big wave to destroy the child, but the child escaped because his soul had come from the sun. Chaifi then tried many ways to destroy the child but was unsuccessful.

The child became a man and told Chaifi he couldn't destroy him and the many souls he had created since they came from the sun. Having no power over souls from the sun, Chaifi returned to Sasalaguan beaten."

Spanish accounts say the Ancient Chamorro treated their tale of creation lightly. No worship or organized religion concerning gods existed.

GIS Training

Continued from page 2...

those with experience using GIS often appreciate the chance to brush up on skills they haven't used in a while. A series of sessions dedicated to introductory material is offered at least twice during the year.

Training sessions are usually held at the Office of Civil Defense at 1:30 pm on Thursdays; the location and time are subject to change, however. The attendees are added to an email list and are informed in advance about the location of training as well as about the content of up-coming sessions. The sessions typically last one and a half to two hours. Training materials, including PowerPoint presentations, lecture notes, a list of useful Internet sites, and step-by-step guides to valuable GIS skills are made available to trainees. Helpful GIS tutorials produced by the Army Corps of Engineers and the National Park Service are also provided upon request.

The weekly GIS training courses will continue to take place at least until December, 2005. If you are interested in taking advantage of this free training opportunity, please contact David Burdick at 735-2185 (dburdick@mail.gov.gu) or Victor Torres at 472-4201 (vtorres@mail.gov.gu).

What is GIS?

A Geographic Information System, or GIS, can simply be described as a "computer-mapping program," but a GIS is actually much more than that. In a GIS, objects in the real world – such as buildings, streets, coral reefs, and even sea turtles – can be represented in a digital form in a computer program, where they are called features. The main difference between a digital house or sea turtle in a GIS compared to, say, a video game, is that we can map their exact location in the real world (e.g. latitude and longitude) using a GIS. A GIS often allows you to see a "big picture" view that you may not see when you are on the ground or in the water. It also allows you to analyze the spatial relationships between different kinds of features. A GIS analysis would be similar to stacking several transparent maps - each map having only one kind of feature (e.g. one map for trees, one map for buildings, etc.) – and examining the way the different features relate to each other by peeling way and adding the layers of maps. A GIS can do this much faster than if you drew the maps by hand and stacked them yourself, and it can also do much, much more.

Another powerful ability of a GIS is the dynamic link between features on the map (e.g. buildings) and a database containing information about those features (e.g. building addresses, owners, etc.). If you click on a building on a GIS map, for example, you could quickly identify the owner, address, and other information about the building that is stored in a table someone has created. Say you were interested in contacting the owners of all the buildings located in a flood zone to notify them of new regulations that may apply to their buildings...you can create the flood zone in a GIS if it does not already exist and you can very quickly select all the buildings located in the flood zone using very simple steps. You can then generate a report with the owner's name and address for only the buildings you selected and send out letters to the owners informing them of the new regulations.

The use of GIS has increased dramatically in the last decade. Workers in many fields, such as emergency management, homeland security, utilities management, natural resource management, and marketing, have recognized the ability of GIS to increase efficiency and allow new applications that were once not possible. GIS has promoted exciting progress within these and many other fields and its application will surely continue to grow.

TNC

Continued from page 4...

agencies, and academic institutions, to develop conservation area plans for priority sites. In addition, she helps secure information and ecological expertise from the academic community, public agencies and institutions, and key private partners, to support TNC's conservation planning efforts, as well as ensuring close integration with TNC's internal science and planning programs.

In 2005, Trina will focus on helping local partners in FSM to build consensus and develop an initial design for a nationwide marine protected area network, through stakeholder consultations in the four states and a national meeting. She will also be working with the MCT to ensure sustainable financing for the nationwide protected area networks in FSM and Palau; providing logistical and technical assistance on an upcoming Pohnpei Rapid Ecological Assessment (REA) and working with partners to plan and conduct similar REAs in support of nationwide protected area networks; helping to develop plans and budgets for additional ecoregional plans and marine protected area work; and identifying funding and other resources needed to support marine conservation in the region.

You can find out more about The Nature Conservancy at their website (http://nature.org/). For more information about the TNC Micronesia Program, you can contact Trina Leberer at tleberer_1999@yahoo.com or call 789-1232.

Article provided by: Trina Leberer

What In The World Is This?

Scientific Name:
Rallus owstoni

Common Name:
Kókó (Guam Rail)

The Guam Rail or Kókó is an endemic bird to Guam, it is only found on this island and no other place in the world. The Kókó is dark brown with white stripes on its stomach. This bird is flightless and builds its shallow nest in the ground. This bird lays up to four large, freckled eggs. Young kókó leave the nest when they are only one day old. Their parents then eat the egg shells. Adult kókó eat insects as well as snails, skinks, and geckos. They live in brushy areas in grasslands or in the jungle. Kókó also like to bathe in the rain. When the birds were abundant, they could be seen along roadways between tall grasses, usually in the morning.

Long-ago, the kókó birds were predominantly abundant that local hunters would catch them for their meals. Today, the kókó is scarce and is protected under the Endangered Species Act. One of the contributing factors to the decline of the kókó is the brown tree snake, a predator to the birds. As a result, it is against local and federal law to capture, harass, or kill a kókó.

In 1983, a captive breeding program was established to ensure that the kókó does not become extinct. An experimental population of rails was initiated in 1990 on our neighboring island of Rota. The environmental conditions in Rota are similar to Guam's and the advantage of the experiment is that Rota is free of snakes. Between 1990 and 1991, about 50 kókó were released in Rota. As of 1994, the captive kókó population stands at over 200 birds on Guam and in various zoos throughout the United States.

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Guam Coastal Management Program
Bureau of Statistics & Plans
P.O. Box 2950
Hagåtña, Guam 93932