

POPULATION DIAGNOSIS AND ANALYSIS OF THREATS OF THE CARRANCHINA TURTLE (*Mesoclemmys dahli*), IN COLOMBIA

By: BOSQUE COLOMBIANO ORG

RESUMEN

Mesoclemmys dahli (Dahl's Toad-headed Turtle o Carranchina turtle) is a species of freshwater turtle, which is distributed in the basin of the Magdalena River and the Sinú River, in the Zenú indigenous territory. This species inhabits slow water bodies of the savannas and has a mainly carnivorous diet; During their life cycle the females move to the mainland to nest in the dry season. In this period of its life, the females are captured by the inhabitants of the region to consume their meat and eggs, carrying out an exploitation that has led this species to near-extinction: it is listed as Critically Endangered (CR). In addition to the direct impact on populations, changes in land use have led to the destruction of the habitat of *Mesoclemmys dahli*. The objective of this work is to analyze the current state of the populations and threat of *Mesoclemmys dahli* in Colombia, in order to stimulate conservation strategies. The conclusions of the study show that comprehensive conservation measures are necessary to articulate conservation, education, sustainability and communication; to avoid imminent extinction. This study has the support of the Zenú indigenous community and regional universities.

Keywords: freshwater turtle, extinction, Zenú indigenous community, conservation.



Figure No. 1: Carranchina turtle specimen. **Source.** E. Red.

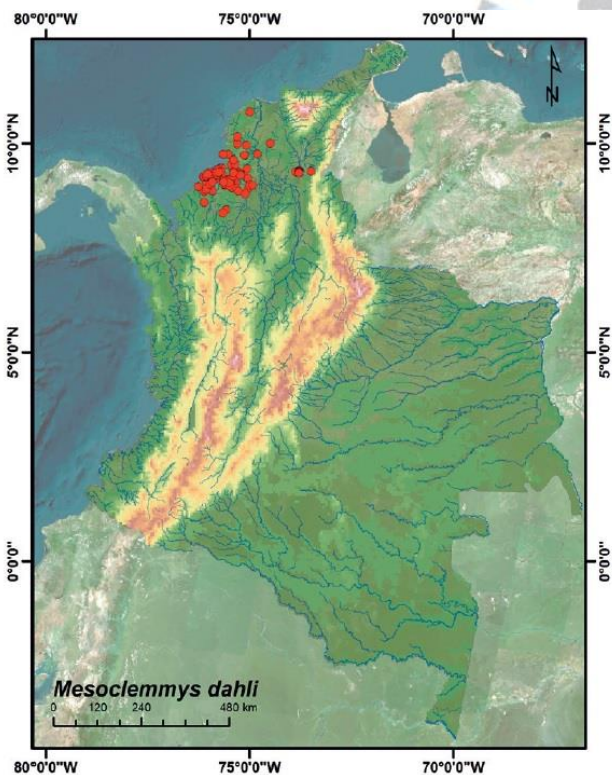
1. GENERAL INFORMATION OF THE DAHL'S TOAD-HEADED TURTLE (MESOCLEMMYS DAHLI)

1.1. Threat category

Global: Critically Endangered CR B1 + 2c (Tortoise and Freshwater Turtle Specialist Group 1996).

1.2. Other common names

Mountain tortoise, head to the side.



1.3. Description

Small-sized tortoise; straight carapace length (LRC) maximum 29 cm (females) and 23 cm (males) (Forero-Medina, unpublished data). Head proportionally large, flattened and very L. E. Rojas widened in the temporal region; the width between the eardrums is equivalent to 23-26% of the CRL (Rueda-Almonacid et al. 2007), it lacks symmetrical horn shields. Carapace low, sometimes with barely visible medial longitudinal keel, mainly in juveniles.

In adults there is a dorsal longitudinal depression that encompasses vertebral II, III and IV. Plastron strong and long but somewhat narrow, especially in males (Medem 1966) and with a well marked posterior notch.

Head gray dorsally, laterally from nostrils to tympanic membrane is light yellow or cream. A narrow dark gray band runs from the nostril to the neck, across the eye; there are two other diffuse dark lines that border the palpebral area, pass over the eyes and end in the temporal region. Ventrally the head and extremities are yellow, like the plastron, sometimes with a red-orange tint (Medem 1966).

1.4. Geographical distribution

Countries: Colombia.

Departments: Atlántico, Bolívar, Cesar, Córdoba, Magdalena and Sucre.

Hydrographic areas: Caribbean.

Sub-basins: Caribe (Sinú), Magdalena (main channel, Cesar and San Jorge).

Altitudinal distribution: 100-250 m a.s.l.

1.5. Bioecological aspects

Aquatic turtle, mainly nocturnal (Medem 1966). It inhabits small wells, streams and streams, temporary or permanent, with slow currents with riparian vegetation in the formation of dry forest, especially in the hilly landscape (Forero-Medina et al. 2012a). However, individuals have also been recorded in swamps and jagüeyes (artificial wetlands) with abundant aquatic vegetation and small shallow wells in paddocks that are formed by the rains (Medem 1966, Castaño-Mora 2002, Rueda-Almonacid et al. 2007, Forero-Medina et al. 2011). In the dry season, specimens have been found in bodies of water with high temperature, shallow, apparently very eutrophic and in many cases without riparian

vegetation (Castaño-Mora et al. 2005). It is omnivorous (Medem 1966, Castaño-Mora and Medem 2002, Rueda-Almonacid et al. 2004, 2007). Rueda-Almonacid et al. (2007) recorded the mating season in the period of maximum rainfall and the laying of the eggs during the dry season. Rueda-Almonacid et al. (2004) found that can travel up to 1.5 km in one night across the mainland and reported a different "range area" between climatic seasons and between sexes.

In the dry season, the females (n = 5) presented movements between 0.94 and 12 ha and in the rainy season between 0, 12 and 10 ha. In the rainiest season, the males covered a total area of 30.4 ha and females an area of 120.7 ha. When there are heavy rains, large currents are generated in the streams that carry the turtles, with which large displacements occur. According to the results of Forero-Medina et al. (2011) on movements of the turtle, the estimated annual range area varies between 1.6-30.8 ha if estimated with the least convex polygon method and between 9.2-22.5 ha using the Kernel estimator. Although they were not found significant differences, the largest movements were recorded during the transition from the rainy to the dry period or during the dry period. Carranchina (*Mesoclemmys dahli*).

1.6. Population information

In the department of Córdoba the species is locally abundant with densities of 20 to 60 captured turtles / ha (Rueda-Almonacid et al. 2004, Forero-Medina et al. 2011). In some cases in jagüeyes (artificial wetlands) these values were up to 500 individuals captured / ha (estimated). In the department of Cesar, densities did not exceed 10 turtles / ha (Forero-Medina et al. 2011). In this same locality, the population sizes estimated by means of mark-recapture in two streams during one year varied between 16 (95% CI, 7–30) and 175 (95% CI, 32–298) individuals (Forero-Medina et al. 2011). The densities, based on the

estimated number of individuals in Cesar, ranged from 16 turtles / ha in April to 170 turtles / ha in June. These values are lower than those recorded for other populations of *M. dahli* in Colombia and other South American chellids.

Apparently the species is more abundant in Córdoba than in Cesar, possibly because the last locality is found on the periphery of the geographic distribution (Forero-Medina et al. 2012b). In the department of Sucre it was estimated that 59% of the jagüeyes have this species as a regular inhabitant (Sampedro-Marín et al. 2012).



Recent genetic studies of *M. dahli* (Gallego-García unpublished) have found that the population is highly fragmented into small subpopulations with low levels of gene flow. This isolation has led to related individuals to reproduce and consequently the species has high levels of inbreeding. The effective population sizes are lower than recommended to ensure that inbreeding depression does not occur in the near future. This aspect may indicate that this species is at greater risk of extinction than previously thought.

1.7. Use

Adult individuals are occasionally consumed in some locations in the departments of Bolívar and Cesar. The same happens in Sucre, where due to the deterioration of the populations of *Trachemys callirostris*, other chelonians such as carranchina are beginning to be used as an alternative food (substitution

effect) (De La Ossa and Vogt 2010). However, intensive use of the species by communities has not been recorded.



1.8. Threats

Its habitat has a high degree of transformation by human activities: loss of vegetation cover, burning, pollution water chemistry, urbanization, agriculture and livestock (Medem 1966, De La Ossa-Velasquez 1998, Castaño-Mora and Medem 2002, Rueda-Almonacid et al. 2007). The tropical dry forest biome of the Caribbean, its typical habitat, has been subject to continuous deforestation and fragmentation caused by activities such as ranching (Ideam et al. 2007). This biome is one of the most transformed and at the same time least protected by the country's system of protected areas (Forero-Medina and Joppa 2010). Rangel-Ch. (Pers. Comm.) Calculated that the flat northern Caribbean, where *M. dahli* is found, may have lost more than 80% of its original coverage. The riparian vegetation of the bodies of water it inhabits suffers intense deforestation or has been totally razed (Rueda-Almonacid et al. 2004, Forero-Medina et al. 2011), which causes overheating and drying out of the wells or lagoons that before they lasted most of the dry season, with unknown consequences for the species. The species was originally discovered in the department of Sucre, in swamps located in what is now the city of Sincelejo and which are currently completely urbanized, although it subsists in the countryside. The farmers of this department who usually cultivate fish in

jagüeyes, eliminate the carranchinas to guarantee the success of such crops.

The burning of weeds as a technique for preparing the soil for cultivation is also the cause of the death of numerous chelonians, especially during the nesting season. Rueda-Almonacid et al. (2004) found that a quarter of the individuals found had burn injuries. Finally, the trampling of cattle also causes mortality (Sampedro-Marín et al. 2012). Additionally, in some places in Córdoba it is caught as bycatch (Rueda-Almonacid et al. 2004), the indigenous, They actively seek them out or the settlers retain those they can find to exchange them for the indigenous people for pancoger products, especially cassava (*Manihot esculenta*) (Castaño-Mora et al. 2005).

1.9. Existing conservation measures

None.

1.10. Conservation opportunities

In Córdoba and Cesar, actions have been carried out to restore the riparian vegetation of the streams inhabited by the species (Rueda-Almonacid et al. 2007, Forero-Medina, unpublished data). Proposed Research and Conservation Measures Carry out ecological restoration activities in the different localities where populations are known. In the same way protect areas contiguous to bodies of water, since these areas are continuously used by the species (Rueda-Almonacid et al. 2004, Forero-Medina et al. 2011). It is necessary to develop mechanisms to prevent individuals from dying during burns of anthropic origin.

It is recommended to designate a protected area of regional or local order for the conservation of the species, since it is endemic to Colombia and a priority species for conservation (Forero-Medina et al. 2015). Finally, detailed studies are required on their reproductive ecology, the effects of human

activities on their populations, and their long-term viability. Additionally, populations must be monitored. Vargas-Ramírez et al. (2012) found a low genetic divergence between *M. dahli* and *M. zuliae*, which is why more genetic studies must be carried out to deepen the issue and define its relationship with other South American chellid species.



1.11. Justification

Carrachina is an Endangered species since it has a reduced area of presence (4,137 km², Forero-Medina et al. 2014). The ecosystems it inhabits have been transformed, reduced and degraded in a remarkable way by 80%. This has caused a population reduction and even the disappearance of the species in some localities, fragmenting the population. Additionally, it has a low gene flow and high levels of inbreeding.

2. POPULATION SITUATION OF THE CARRANCHINA TURTLE

The tropical dry forest of the Colombian Caribbean is the habitat of the carranchina turtle (*Mesoclemmys dahli*), an endemic species of Colombia that is in danger of extinction. The degradation and destruction of these forests is the main cause that this species, so little studied, is on the verge of disappearance.



For this reason, scientists from the National University of Colombia, the University of the Andes, Worldlife Conservation Society (WCS) Colombia and the Turtle Survival Alliance carried out a genetic study that has revealed the true conservation status of this species.

The investigation entitled Genetic evidence of fragmented populations and inbreeding in the endemic 'carranchina' turtle in Colombia has made it possible to make important findings about this species that inhabits one of the most degraded areas of the country, explains biologist Natalia Gallego García, co-author of the research.

2.1. Disappearing forests

The destruction of the tropical dry forest of the Colombian Caribbean endangers the survival of the carranchina turtle. Photo: Germán Forero / WCS Colombia. © Germán Forero / WCS Colombia. The serious fragmentation problem suffered by the tropical dry forests in Colombia and in particular in the Colombian Caribbean, the habitat of these turtles, has become the most serious obstacle to their survival. The tropical dry forests of Colombia have been severely transformed and fragmented by human activities, mainly by grazing and agriculture, indicates the research published in Conservation Genetics.

“The carranchina turtle is much more threatened than previously thought, and if measures are not taken in this regard, the species will soon be lost. If it disappears from the Colombian Caribbean, then it becomes extinct all over the planet because it does not exist anywhere else in the world”, explains Gallego.

It inhabits streams and ponds, especially those with a high percentage of vegetation cover on their banks. However, this vegetation has been subjected to intense deforestation, and in some places, completely eradicated, the article explains.



According to the research, the level of fragmentation of the habitat leads to the fractionation of the population, a situation that is exacerbated in the case of this species due to its difficulty of movement that prevents it from moving to other areas of the landscape.

The most significant finding has been to discover that the species is fragmented into small groups of very few individuals. As a result, it is beginning to lose genetic diversity and increase inbreeding - reproduction with close relatives - to very dangerous levels.

The small number of individuals in these groups, which are also isolated and with very little capacity for movement, increases their risk of extinction.

Mobility is very important for any species, since migrants carry with them new genes that residents do not have, thus increasing their

genetic diversity, if this does not happen, the species becomes more vulnerable to changes in the environment and possible disappearance.

As for the serious problem that occurs with small and isolated populations by inbreeding, that is, reproducing with close relatives, it increases the probability of acquiring defective genes or mutations, which lead to rare diseases, sterility or even death. Consequently, populations with a high level of inbreeding are much more likely to go extinct.

"In the case of this species of turtle, the levels of inbreeding that we find are so high that they resemble those of a cross between half-siblings, uncle-niece, grandfather-granddaughter or any combination with a second degree of consanguinity," he explains. the biologist.

2.2. Loss of genetic diversity

The species also faces another problem called 'genetic drift', that is, another way of losing genetic diversity, which is explained by the random transmission of genes from parents to offspring.

As it is a random process, it may happen that in this transmission some genes are no longer inherited to the next generation, therefore, a certain gene disappears forever. The increase in adult mortality due to cattle trampling, pasture fires, overheating and drying of some of the water sources that previously persisted during the dry season, and the loss of nesting and estivation sites are other problems it faces. this species.

3. THREATS

3.1. Domestic animals

The beaches near the populated centers are rarely used by the turtles for nesting, because

the anthropic activity is very high; However, some turtles spawn sporadically on beaches near small hamlets, where clutches lost by domestic animals such as dogs and pigs have been recorded. The animals not only affect the eggs, but also disturb the females at night when they lay eggs.

3.2. Nest looting

Turtle eggs are highly sought after throughout the entire basin. Although in the Sinú almost no riverine leaves by In the early mornings with the aim of looking for clutches, every time they pass by a beach and find the trail of a female in the sand, they collect her eggs. This activity is so widespread that in the river basin there is no beach exempt from this threat.

3.3. Alteration of the river flow

A threat to the survival of turtle eggs in Sinú is the frequent and unforeseen flooding of the beaches, caused by the generation of energy from the Urrá hydroelectric plant. Before the construction of the hydroelectric plant, the flow regime of the Sinú River corresponded to a dry period from mid to late December, to mid to late April, and to a period of abundant flows during the remaining months. These regimes of precipitation determined the outcrop of the beaches, initiating the positions. Starting in 2000, when the hydroelectric plant entered service, the seasonality of the river was subject to the power production of the plant and not to the rain regime.

According to the regulations of the electricity sector, the plant could only operate with one or four units during the first ten years of operation. This situation limited the operation, since only very low or very high discharges could be generated, making it difficult to

reproduction of the natural hydrological trends of the dry and rainy period that existed before the construction of the dam. The sudden changes in the flow caused the flooding of the

nesting beaches, drowning the clutches that were in incubation and preventing the females from finding optimal places for the laying of the eggs.

3.4. Sand extraction from rivers

The extraction of sand from the beaches and the river bed has become one of the most common tasks of the inhabitants of the banks of the Sinú. Although this activity is regulated by the Mining Code (Law 685 of 2001), it is evident that in the department it is not controlled and that many sandboxes do not have environmental licenses. Sandboxes find and damage multiple clutches with their shovels while digging; in the most extreme cases, the trucks that come to fetch the material go down to the beaches, compacting the sand and crushing the clutches in their wake. In some sectors, especially in the Sinú environment, this activity is carried out at night and at dawn, disturbing the posture.



3.5. River pollution

Another threat that threatens the quality of the turtle's habitat is the contamination of water due to the uncontrolled use of pesticides, herbicides and fertilizers to maintain crops. Added to this are the organic and inorganic wastes thrown into the river by riparians throughout the basin. Although unknown the effect of pollutants on turtles may be directly or indirectly affected.

3.6. Livestock and extensive agricultural activities

Livestock is an activity that puts the survival of river turtle eggs at risk. In most of the farms, ports have been built so that livestock can approach the river to drink water. The inconvenience of this fact is that when the water level drops, the cattle have to cross the beaches to get closer to the river, crushing eggs as they go and compacting the sand, which prevents the correct hatching of the neonates that manage to survive. On the other hand, in the Sinú river basin, cattle ranching and extensive agriculture are the main causes of the loss of gallery forest and the drying up of wetlands. The felling of the forest not only affects the availability of food for the turtles, but also reduces the number of fallen trees that are used as sunning and refuge sites for these species.



3.7. Illegal trafficking and poaching

Some experienced turtle hunters go out to catch these species, year after year, along the Sinú River basin. Others carry out this work occasionally or accompany experts. Fishing tasks and the technique of catching used vary according to the individual, but only the experienced ones use devices such as hooks, traps or gillnets to catch them in the water. The inexperienced walk the beaches they find in their path when they go out at night in their canoe to fish, catching females and collecting eggs. This practice is increasingly common due to the advantage of capturing turtles in the

time spent fishing and the fact that no special hunting skills are required. The number of turtles that a hunter you can catch in one day is limited to both successful fishing and transportation. Due to their large size, it is difficult to camouflage them, since a sack does not fit more than three or four large individuals.

Although on a very good day a hunter can catch up to ten turtles, they rarely do so because they have no way to get them home. Despite these drawbacks, only in the basin

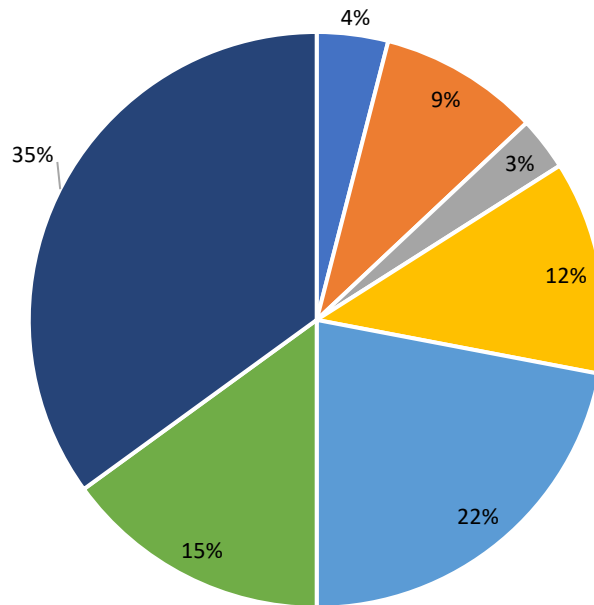
downstream of the river, an average extraction of two hundred animals per year has been estimated (Gallego-García, 2009). The hunting destination for trade and local consumption of hunted turtles is for sale or family consumption, depending on economic or food needs; Its demand increases on the eve of Holy Week, since in Córdoba they have a tradition of consuming turtles on holy days. The price of a copy ranges between ten thousand and thirty thousand pesos, depending on its size and demand.

Adult females are the most expensive and desirable due to their large size and the eggs they can carry inside (Gallego-García, 2009), unfortunately they are also the easiest to capture, since they are the only ones that come ashore when they go to oviposit.

All this, added to the fact that the hunting season coincides with the reproductive season of the turtle, means that directed hunting is biased towards adult females, which is possibly altering the structure of the population. Opportunistic hunting has become widespread because the turtles go up to the riverbanks to spawn more frequently, due to the irregularity of the river levels and the absence of beaches. On their journey, some of them wander too far from the banks and few Sometimes they find their way back to the river, as they are captured. Although this behavior protects the broods from the floods,

it exposes the females to be more easily captured. Almost no female found wandering the banks is returned to the river.

Threat weighting



- Domestic animals
- Alteration of the river flow
- River pollution
- Illegal trafficking and poaching
- Nest looting
- Sand extraction from rivers
- Livestock and extensive agricultural activities

BOSQUE COLOMBIANO

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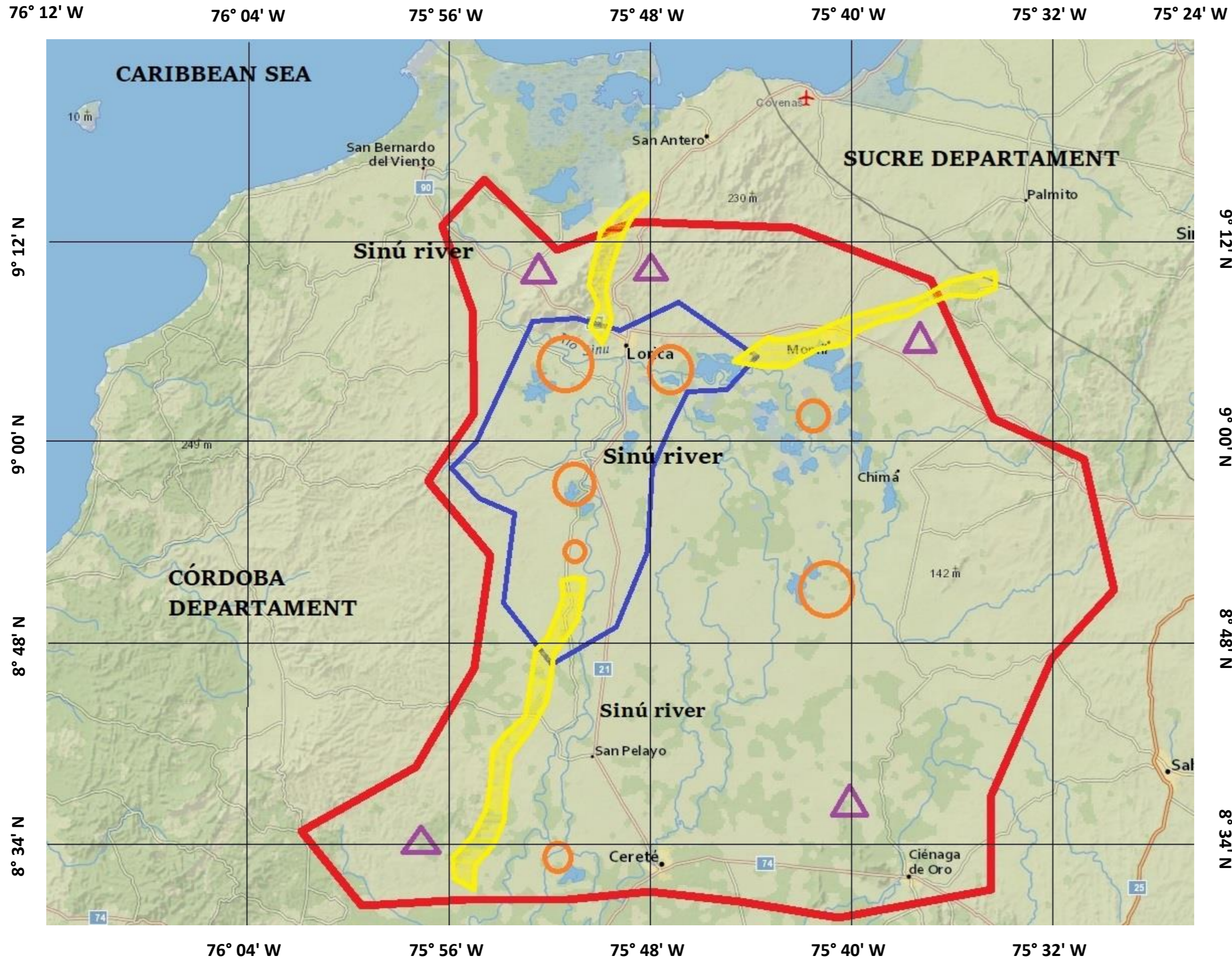
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PROJECT MAP



ETHNO-PROGRAM FOR THE SUSTAINABLE CONSERVATION OF THE DAHL'S TOAD-HEADED TURTLE (*mesoclemmys dahli*), IN COLOMBIAN.

CONVENTIONS

█	Project area
█	Proposed protected natural area
█	Carranchina turtle populations
█	Illegal trafficking wildlife routes
█	Zenú indigenous cities

SCALE



GEOGRAPHICAL POSITION:

1. Country: Colombia
2. Departments: Sucre and Córdoba
3. 1,800Km² in the Zenú indigenous territory, on the banks of the Sinú river.
4. Geographic coordinates: 8 ° 34 "N and 76 ° 04" W, with 9 ° 12 "N and 75 ° 32" W.

SOURCE:

- BOSQUE COLOMBIANO ORG, 2020.
- IMAP: biodiversity map of Colombia, 2018.

