



State of the Mangroves in CAGAYAN

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I. INTRODUCTION

The province of Cagayan comprises an aggregate land area of 929,500 ha making it the second largest province in the region. It is bounded by Balintang Channel and Babuyan Group of Islands on the north; Pacific Ocean on the east; Isabela province at the south; and the Cordillera Mountains on the west. A set of islands can be found at the northern tip of the province namely, Palau, Fuga, Calayan, Dalupiri, Camiguin and Babuyan Claro.

Cagayan has 28 municipalities and one city divided into three congressional districts, and consists of 820 barangays. Tuguegarao City is the provincial capital, regional seat, and the center of business, trade and education.

Cagayan has a total coastal land area of 143,874 ha. There are 11 coastal municipalities in the mainland corridor along the Babuyan Channel. These municipalities are divided into western and eastern segments by the mouth of the Cagayan River: Santa Praxedes, Claveria, Sanchez Mira, Pamplona, Abulug and Ballesteros on the western segment, while Aparri, Buguey, Santa Teresita, Gonzaga and Santa Ana are on the eastern segment. Calayan Municipality comprises the Babuyan Group of Islands and lies north of the main corridor. The municipalities of Peñablanca, Lallo and Baggao are in the Pacific eastern seaboard.

Cagayan's 455-km coastline constitute ~73% of the regional coasts of Cagayan Valley. The province has among the longest coastlines in the country. Aside from its long coastline, the province also has extensive inland shores around large rivers and their tributaries, lakes, creeks and streams that provide rich fishing and aquaculture grounds. There are untapped coastal fishing grounds along the northern coasts or the Babuyan Channel corridor (from Santa Praxedes to Santa Ana), and along the Pacific eastern seaboard (from Santa Ana to Peñablanca). Despite this

endowment, the province's fish production is not enough to supply and sustain its own fish requirements.

Cagayan's deep-sea fisheries are known for its tuna, tuna-like fishes, hairtail, snapper, scad, slipmouth, mullet, grouper, shrimp, squid and lobsters. The inland waters are used primarily by subsistence fishers. Few privately operated fishponds and fish cages contribute to the overall fish supply of the province. Only about 1,894 ha are used for fishpond operations and only 1,369 ha of this are used for brackish fishpond operations. Various fish cage cooperators use a total of 1,289.5 m², of which operators of brackish fish caging use a total of 1,189.7 m².

About 91 ha are used for other aquaculture activities like oyster, mussel and seaweed culture. The beaches and waters surrounding Port Santa Ana up to Cape Engaño in Palau Island offer haven for fishing and SCUBA enthusiasts. This area is also known for the diversity of prime value fish species caught. Santa Teresita is traversed by two rivers: the Buguey Lagoon and the Caroan River of the adjacent municipality of Gonzaga. Santa Teresita abounds with swamps and marshes that are rich in aquatic resources especially those located at barangays Buyun, Simbaluca, Caniugan, Simpatuyo, Centro East and Centro West. An aggregate area of 183.8 hectares is partially developed fishponds producing four metric tons of fish annually. Aquatic products from brackishwater fishponds and a creek include milkfish, mullet, tilapia, and crustaceans such as shrimps, prawns and crabs.

Importance of Mangroves

Mangroves have a unique set of characteristics compared to other set of ecosystems, one of which is its tolerance for high salinity. The range of economic and ecological benefits were briefly discussed by Fortes and Jara (1987).



Mangroves play an important role in maintaining the ecological balance of coastal communities at Cagayan. It provides habitat and nursery ground for many species, and thus supports the fisheries. Mangrove areas provide important sources of seafood such as mollusk, gastropods, and numerous food fish. Mangroves also serve as defense against strong typhoons and storm surges. In spite of their enormous importance, mangrove trees have been continually cut and mangrove forests are now degraded and reduced.

The awareness in the importance of mangroves came with the growing concern on biodiversity, conservation and the dwindling forest cover. The estimated original cover that ranged from 400,000 to 500,000 ha has been reduced to 139,000 ha in 1988.

II. STATUS OF MANGROVES

Cagayan has approximately 3,967.9 ha of mangrove areas. The distribution of old stands, secondary growth and plantations were not identified (**Table 21**). These are distributed throughout the municipalities of Abulug, Aparri, Buguey, Calayan, Claveria, Gonzaga, Pamplona, Sanchez-Mira, Santa Ana and Santa Teresita.

The mangrove forest of Abulug covers an aggregate area of approximately 841.40 ha. These are sporadically located in the coastal barangays of Centro and Siguiran. The general status of mangroves here is classified as fair since less than 41% of the area has living mangrove trees. Most of the areas manifested severe cutting, heavy erosion and siltation.

As for Aparri, the DENR latest data show a total aggregate area of 1,093.5 ha of mangroves. These are located in barangays Linao, Bisagu, Sanja, Bulala Sur, Navagan, Binalan, Caagaman, Gaddang and Maura. The mangrove areas of Aparri are dominated with *Nypa fruticans* (nipa) equivalent to 98% while the remaining 2% are made up of the mangrove species *Bruguiera sexangula* (pototan), *Ceriops decandra*, *Ceriops sp.* (lapis-lapis), *Dolichandrone spathacea* (tui), *Excoecaria agallocha* (buta-buta), *Heritiera littoralis* (dungon late) and *Sonneratia alba* (pagatpat), which are mostly found along rivers and creeks.

Table 21: State of mangroves in Cagayan (in hectares)

Old Stand	Secondary Growth	Plantation
no data	no data	278

Most of the mangrove areas of Buguey are either lost or degraded mainly because of the unabated reclamation, alteration or massive conversion of mangrove forests into fishpond, residential and other purposes. The decline of the mangroves is paralleled by the decline of municipal fisheries catch. Conversion of mangrove areas into fishponds has left only small patches of mangrove stands in the area. However, good mangrove stands are still found in barangays Villa Leonora and Calamegatan. The mangrove areas of barangays Quinawegan, San Vicente, Santa Maria and Pattao of Buguey are dominated by *Nypa fruticans*, as observed during assessments of planting site for mangrove reforestation and rehabilitation. There were also a few stands of mangrove tree species such as *Avicennia officinalis* (api-api), *Aegiceras corniculatum* (saging-saging), *Bruguiera sexangula* (pototan), *Rhizophora mucronata* (bakauan-babae) and *Sonneratia alba* (pagatpat). A total of 121.4 ha are being surveyed as proposed planting site for mangrove reforestation and rehabilitation. Based on the observation, nipa species in other barangays were cut for nipa shingles because this is one of the alternative sources of livelihood among the people.

Mangroves are found in three of the four islands of Calayan Municipality, namely: Calayan Island, Camiguin Island and Dalupiri Island. In Calayan Island, few mangroves are found in Barangay Dibay whereas Barangay Dilam has around 10 ha of mangrove area comprised of the mangrove species *Ceriops tagal* (tangkal), *Rhizophora mucronata* (bakawan-babae), *Rhizophora apiculata* (bakawan-lalaki) and *Sonneratia alba* (pagatpat), and other associated tree species. These same species of mangroves and associated trees were found in the 24-ha mangrove area in Camiguin Island, particularly along the coast of Barangay Naguillian and the Nagtamurungan creek. Dalupiri Island has patches of mangroves approximately 5 ha in area, notably inhabited by the Philippine crocodile (*Crocodilus mindorensis*) as documented by the Mabuwaya Foundation based in Isabela State University.

Mangrove areas in the municipality of Claveria are estimated to be around 45 ha and comprise mainly of *Nypa fruticans* (nipa) and *Ceriops tagal* (tangkal). They are found in barangays Centro IV, Centro V, Centro VI, Centro VII, Pinas, Santa Maria, Dibalio, D. Leño, Pata West, Pata East, and Magdalena particularly along Cabicungan River, Pata River and their tributaries. Most of these areas have been converted into settlements, agriculture (e.g. rice, vegetables and coconut), and fishponds. About one hectare was eroded into the rivers and some remained unplanted. There were about 17.5 ha mangrove areas within alienable and disposable lands in Pata East, but some were already





titled and utilized in the establishment of fishponds and palay production, while portions are under the stewardship of BFAR for its research and production purposes.

The municipality of Gonzaga has mangrove forests sporadically located in seven coastal barangays with swamp and brackish areas, which cover an aggregate area of approximately 69.1 ha. Generally, the status of the mangrove forests of the municipality is poor with an average of 25% living mangrove trees. Most of the areas manifested severe cutting, heavy erosion and siltation specifically observed in barangays Caroan and San Jose, where the largest tracts of mangrove forest in the municipality are located.

The municipality of Pamplona has mostly inland nipa swamps, which cover an aggregate area of approximately 702 ha situated within “alienable and disposable lands” (515.0 ha) and public lands (187.0 ha). Nipa swamps are found along the riverbanks, waterways and tidal flats of riverine areas and tributaries. Nipa swamps are located in barangays Tupanna, Tabbá, Cabaggan and Nagtupakan. In barangay San Juan, strips of *Nypa* also draw inward following river tributaries, gullies and waterways as far as the saltwater tide can reach. Along Bangan River in barangays Allasitan and Bidduang, only strips of *Nypa* clumps with an average of 10 meters can be found.

The municipality of Sanchez-Mira has a two-hectare nipa swamp in Barangay Masisit, which has been described to be in good condition. Several stands of *Sonneratia caseoralis* (*pedada*), *Sonneratia alba* (*pagatpat*), *lapis-lapis* (*Ceriops decandra*) and *Osbornia octodonta* (*tualis*) grow along the waterline while thick vines, grasses and shrubs are observed along the shoreline. Thin strips and patches of mangrove-associated species can be observed in Barangay Namuac, particularly along the Namuac-Pata River with a stretch of 3 km near its end. Patches of *Nypa* are dense and thick serving as bank protection for the rice fields.

The municipality of Sta. Ana has approximately 639.2 ha of mangroves. These areas serve as fish sanctuary, buffer zone and more importantly habitat and breeding ground of various species of fish, crustaceans and mollusks. Some community residents depend on mangrove resources as their source of livelihood such as fuel, fence, fish corrals and housing materials. Mangrove areas are found in barangays San Vicente, Tangatan, Sta. Cruz, Diora-Zinungan, Rapuli and Patunungan. Dominant species include *Acanthus* spp. (*lagiwliv*), *Avicennia* spp., *Bruguiera* spp. (*pototan*), *Nypa fruticans* (*nipa*) and *Rhizophora* spp. (*bakawan*). Other species observed include *Aegiceras corniculatum* (*saging-saging*), *Avicennia lanata* (*piapi*), *Avicennia marina* (*bungalon*), *Avicennia officinalis* (*api-api*), *Ceriops*

tagal (*tangal*), *Terminalia catappa* (*talisay*), *dungon-late*, *langarai*, *mangasiriki* and *sapinit*.

The municipality of Santa Teresita has an aggregate mangrove forest area of approximately 340.1 ha. These are sporadically located in six coastal barangays, namely: Simbaluca, Centro East, Caniugan, Simpatuyo, Buyun and Centro West.

Degradation of Mangrove Forests

The declining mangrove forest cover is one of the increasing concerns of the government. On top of the of the annual investment on rehabilitation activities of remaining forest stands, the present administration set aside one billion pesos to cover expenses on the rehabilitation of remaining mangrove forests. However, there are still threats to the mangrove areas of Cagayan as enumerated below.

1. *Urbanization.* Mangrove forests are reduced into much smaller patches to create more settlements for the growing coastal population. The expansion of agricultural areas in Cagayan also contributed much of the degradation of mangrove forest.
2. *Fishpond Expansion.* Large areas of mangroves were converted into fishponds in the municipalities of Buguey, Santa Teresita, Aparri and Santa Ana. Most of these mangrove areas have been claimed as part of the alienable land. The owners have reaped the short-term benefits at the cost of deteriorating these areas. This has led to higher costs of fish production than profits. Saltwater intrusion are also evident in some mangrove areas of Aparri.
3. *Lack of awareness or priority.* Coastal inhabitants have not fully appreciated the value of mangrove forests nor the efforts to rehabilitate them. The incessant gathering of firewood and the trampling of mangrove seedlings attest to this. Rehabilitation of mangrove areas also lack the needed attention from their managers, resulting to the low survival of seedlings. Thus, instead of being rehabilitated, these mangrove areas may become further degraded.
4. *Rehabilitation techniques.* Two decades of mangrove rehabilitation saw little success in terms of increasing vegetative cover because the site managers were not able to determine the right mangrove species and the appropriate techniques for restoration and silviculture. The rehabilitation efforts did little to consider zonation patterns, which was already a basic concept or practice in such efforts. Most rehabilitation activities were project-driven and primarily focused on the number and height of seedlings being planted. Site managers



tried to resolve these issues by planting *Rhizophora* species, which also turned out to be unsuitable for the area. Only the recent prohibition of planting mangroves in seagrass areas broke the cycle of failures that was repeated for two decades. Ironically, most of the reforestation sites were situated in the low inundated areas.

5. *Potential effects of increased seawater temperatures.* In 2010, most of the *Avicennia* propagules planted at Buguey lagoon swelled. The people's organization, local government and project coordinators replanted the area several times but survival rates were low. It was later speculated that the low survival rate in the area was due to the increased water temperature.

III. MANGROVE PROTECTION AND MANAGEMENT

Monitoring and Evaluation

The implementation of foreign-assisted project on integrated coastal resource management improved the vegetative cover of mangrove areas in Cagayan. Most of the efforts in monitoring and evaluating the state of mangrove resources are through the participatory coastal resource assessment conducted every two years by coastal LGUs. Resources are shared during these activities. The community and LGUs are actively involved, and technical assistance is provided by the DENR and BFAR. The results of these assessments are presented and discussed with the community, which serve as basis for participatory planning, and planning by the provincial government.

Impacts of Mangrove Rehabilitation

Mangrove rehabilitation is a growing interest among the coastal municipalities of Cagayan. Rehabilitation was supported by foreign donors and regular funds from DENR. This resulted to 278 ha of rehabilitated area from 2001 to 2006. Petron Philippines is also a regular partner

in mangrove rehabilitation activities especially during the annual celebration of "Ocean Month", which happens in May. Other government entities also assist voluntarily during tree planting activities. Abulug and Pamplona maintain a good cover of *Nypa* stands for the production of shingles, wine and vinegar. This also helps in the growth of different crustaceans that the fisherfolks regularly catch to supplement their income.

The different calamities that hit the country have increased the awareness of the people on the importance of caring for their mangrove areas. As a remarkable example, the owners of titled mangrove areas at Gonzaga voluntarily gave their land rights to the local government for the development and protection of mangrove areas.

IV. SUMMARY AND RECOMMENDATIONS

In coastal areas, mangroves serve as a line of defense during calamities and therefore should be given top priority in resource management. The large tract of mangroves in the province that were converted into fishponds, agriculture, and other land uses should be reverted back to its natural state. The direct and indirect ecosystem services of mangroves, particularly its carbon sequestration potential, still need to be further developed.

Cluster planting is highly recommended in rehabilitation efforts since it was observed that propagules have higher chances of survival with closer spacing as compared to the conventional terrestrial planting of forest species. The best management option is to engage the coastal communities in the maintenance and protection of mangrove areas.

V. REFERENCES

- Fortes MD, Jara R. 1987. Economic and ecological importance and potentials of mangrove areas. Forest Research Series 4: 61–66.

