Coconut plantations can play an important part in countering the effects of climate change through the process of carbon sequestration. Carbon sequestration is the process of capturing and storing carbon dioxide from the atmosphere.

Not all plants sequester carbon equally. Much of the carbon that annual crops such as lettuce, maize and rice sequester from the atmosphere is re-released when they are harvested or degraded. Perennials, such as coconuts require less soil disturbance and with a lifespan of 50-60 years, coconut trees survive for multiple seasons, which means that they have a much higher ability to protect soil carbon than many other plants. Forests and tree plantation crops, such as coconuts, are especially useful as carbon reservoirs because trees hold on to significantly more carbon per unit area than other types of vegetation.

Coconut-based ecosystems offer great hope for the enhancement of carbon sequestration through annual intercropping with effective crop combinations to provide optimal benefits for the whole system. Scientists have also found that coconut-based mixed cropping systems can improve microclimatic conditions, influencing air and soil temperature and soil moisture content of plantations.

https://www.forbes.com/sites/daphneewingchow/2019/11/17/climate-smart-coconut-agriculture-could-be-the-caribbeans-tree-of-life/#6352a6807ea6

The Coconut tree being a perennial plant has an extremely high carbon sequestrating capacity. Coconut plantations are good candidates for 'clean development mechanism' according to published reports (Ref: presentation of Saverino S Magat of Philippines)

Based on the yield capacity of the coconut tree, it has been estimated that the carbon sequestration potential of coconut trees ranges from 20.58 tons/ha/year for 60 nuts yielding trees to 58.51 tons/ha/year for 250 nuts yielding trees. Pre-bearing trees are estimated to have the capacity of carbon sequestration of an average of 15.2 t/ha/yr.

https://deejayfarm.com/blog/carbon-sequestration-deejay-hybrid-palms/

Using the above example on the 800 acres, 54,400 trees = 324 hectares

324 x 58.52t = 18,960t per year

1000 acres (400hectares) 63,750 pre bearing trees

400 x 15.2t = 6,080t per year

The average carbon dioxide emissions per capita for Malaysia was 8.05t in 2017

https://ourworldindata.org/grapher/co-emissions-per-capita?tab=chart&country=MYS

Carbon sequestration offset for 800 acres is equivalent to 2,355 individuals

1000 Acres equivalent to 755 individuals

When both plantations are mature
724 x 58.51t = 42,354t which equates to carbon offset for 5,261 individuals

According to Dr. Severino S. Magat of the Philippine Coconut Authority (PCA) in a seminar titled, "Coconut: Its Mitigation and Adaptation to Climate Change":

It was found that among the crops studied, coconut had an average of C storage of 24.1 t C/ha per year. The crop was also found to have the most stable C storage, being a perennial crop with almost nil burning of crop residues in place at the farm compared to other agricultural crops such as rice and sugarcane. Positive values of actual ecosystem C balance, according to Dr. Magat, "indicates that carbon is sequestered from the atmosphere and stored in the plantation." And given more refinements on the variability in findings, Dr. Magat said that these positive values on carbon sequestration in coconut-based agro-ecosystems could provide accurate and objective information and data for a carbon/market.

In coconut, similar to most tree crops, carbon is stored or sequestered both by the biomass and the soil of the ecosystem, indicating that the biomass and the soil are the main carbon sinks of atmospheric CO2. These "sinks" could be regulated and managed to a great extent by following proper cropping practices, Dr. Magat explained.

He noted that coconut plantations or farm ecosystems could be used to reduce CO2 emissions via C capture or sequestration in the crop-soil system through: 1) substitution of fossil fuel using biodiesel or biomass from coconut oil, 2) sequestration of C in coconut plantation, mono-crop or with intercrops, 3) enhancing C sequestration through coconut plantation management, and 4) conserving C sink in coconut farms.

https://bar.gov.ph/index.php/press-room/news-and-events/749-2011-02-coco-climatechange

Productive and Sustainable Coconut Farming Ecosystems as Potential Carbon "Sinks" in Climate-Change Minimization:
(A Review and Advisory Notes) a Severino S. Magat, PhD Scientist IV and Department Manager III, R & D, and Extension Branch
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E.1 **Net Primary Productivity (NPP) of Coconut**
(i **)** Using a coconut hybrid, Vanuatu Red Dwarf cross with Vanuatu Tall or VRD x VTT, grown under almost optimum crop nutrition in high a fertility level soil and without drought problem, Navarro et al (2008) reported the total NPP of coconut + grass under-storey of 32 t dry mass/ha/yr (i.e., 16 tC/ha/yr, 50% of total NPP); **NPP of coconut trees = 12 tC/ha/yr** (coconut copra yield of 2.7 t/ha/yr.

(ii) From same work area, the apparent **NEP (or the actual ecosystem C balance)** of the coconut plantation of is an average of 8.1 tC/ha/yr (3 years data) compared to a standard calculation of 4.7 tC/ha/yr. As the copra yield (11% of NPP) is taken out of the field, thus a correction has to done (i.e., less 1.3 tC/ha/yr), giving a corrected **NEP of 3.4 to 6.8 t C/ha/yr.**

(iii) Compared to forest trees (typically dicot) of which C goes into the more permanent structures (stems and coarse roots), the **coconut palm allocates more than 86% C into perishable or (easily decomposed) parts as nuts/fruits, leaves, peduncles and fine roots**, shortly converted into litter, respired by the ecosystem, eventually contributing to the soil organic matter (SOM) build-up.

(iv) If this inherent attribute of the coconut or its ecosystem is not adjusted (or just the usual C accounting in forest inventories is followed, the significant underground C in soil organic matter and litter is excluded, hence, the carbon credits and value (subsidies) in coconut farms and ecosystem is undervalued.

(1) Coconut plantations or farm ecosystems could be used in many ways to reduce CO2 emissions via C capture or sequestration in the crop-soil system are: (1) substitution of fossil fuel using biodiesel or biomass from coconut oil; (2) sequestration of C in coconut plantation, mono-crop or with intercrops; (3) enhancing C sequestration through coconut plantation management; and (4) conserving C sink in coconut farms. The coconut tree, a woody perennial with single main stem meets the criteria of "forest" per FAO criteria. The Philippine Department of Environment and Natural Resources (DENR) Order No 2005-25 included coconut as a reforestation crop, effective Nov. 17, 2005.

With almost constant % C, the stored C averaged 24.1 t/ha and 5.74 t/ha, for productive bearing and pre-bearing palms, respectively. Compared to other the ecosystems studied: rice, sugar cane and grasslands, the coconut has the most stable C storage, being a perennial with almost no field burning of farm residues in practice.