



Certifying and monitoring restoration projects  
with verifiable impact on climate, biodiversity  
and livelihoods.

# *Las Delicias - Q4 2022*

## *Quarterly report*





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## Fresh from this Quarter!

### Quarter highlights

Updated information from the Bahía Lomas and Deborah nursery.

- Cleaning of the nursery.
- Reseeding of seedlings and propagules in the bags with substrates.
- Propagule collection.
- Total of 11,000 seedlings (bags with propagules planted) were established.
- Monitoring within 15 days of establishment and every 15 days after that.

Updated information from Las Delicias Islet

- Reforestation with students from the Autonomous University of Chiriquí, 17th and 18th of November 2022.
- Reforestation with students from I.P.T.A. El Silencio and Finca 32 School, December 2nd 2022.

### Detailed information from the Quarter

#### Techniques used

**Substrate treatment:** Small arthropods found in the substrate were removed, as well as coarse roots, stones and any non-biodegradable material.



Figure 1. Treatment of substrate for seedlings: a) 23/11/2022 09:16 a.m. N 09° 31.637', W 082° 35.727'; b) 23/11/2022 09:52 a.m. N 09° 31.637', W 082° 35.727'; activity carried out with students of the I.P.T. Agropecuario.

**Filling and arrangement of the bags:** During the filling of the bags, the substrate was moist, the bags were filled, and the seedlings were arranged in blocks or beds of 10 rows, with a distance between blocks of 60 cm.



Figure 2. Arrangement of bags with seedlings: a) 22/11/2022 02:23 p.m. N 09° 31.637', W 082° 35.727"; b) 24/11/2022 09:10 a.m. N 09° 11.524', W 082° 19.692; activity carried out with students of the I.P.T. Agropecuario.

**Fertilisation:** After transplanting, the first application of foliar fertiliser NPK 20-20-20 was made at a dose of 3 grams per litre of water, and this is repeated every 15 days.



Figure 3. Fertilisation of seedlings: a) and b) 22/11/2022 09:29 a.m. N 09° 31.637', W 082° 35.727'; activity carried out with students of the I.P.T. Agropecuario.

**Phytosanitary control:** Removal of weeds in the bags and aisles, carried out manually. Developer also discarded propagules affected by the weevil, which causes the seedlings to grow weakly.



Figure 4. Phytosanitary control on seeds and seedlings: a) 21/11/2022 11:11 a.m. N 09° 31.637', W 082° 35.727'; b) 24/11/2022 09:48 a.m. N 09° 11.524', W 082° 19.692'; activity carried out with students of the I.P.T. Agropecuario.

**Seedling measurements:** During the monitoring process in the nursery, data are taken on the height and development of the seeds and seedlings to keep track of the seedlings for planting.



Figure 5. Monitoring, data collection on seed and seedling development: a) and b) 24/11/2022 11:00 a.m. N 09° 11.524', W 082° 19.692'; activity carried out with students of the I.P.T. Agropecuario.

**Establishment of transects:** Before carrying out the reforestation activity, the place where there is a lack of trees to be planted is located, and areas with non-surviving seedlings and new areas are identified for the establishment of transects, which is nothing more than where the new plantings will be located.



Figure 6. Measurement, location and establishment of transects for planting: (a) 16/11/2022 02:56 p.m. N 09° 20.685', W 082° 14.370'; (b) 17/11/2022 01:16 p.m. N 09° 20.685', W 082° 14.370'; c) and d) 01/12/2022 12:44 p.m. N 09° 20.685', W 082° 14.370'; c) and d) activity carried out with students of the I.P.T. Agropecuario.

**Placement of stakes:** After establishing the transects, stakes are placed according to the planting distances of 2m x 2m. This helps to maintain order at the time of reforestation and also at the time of tying up.

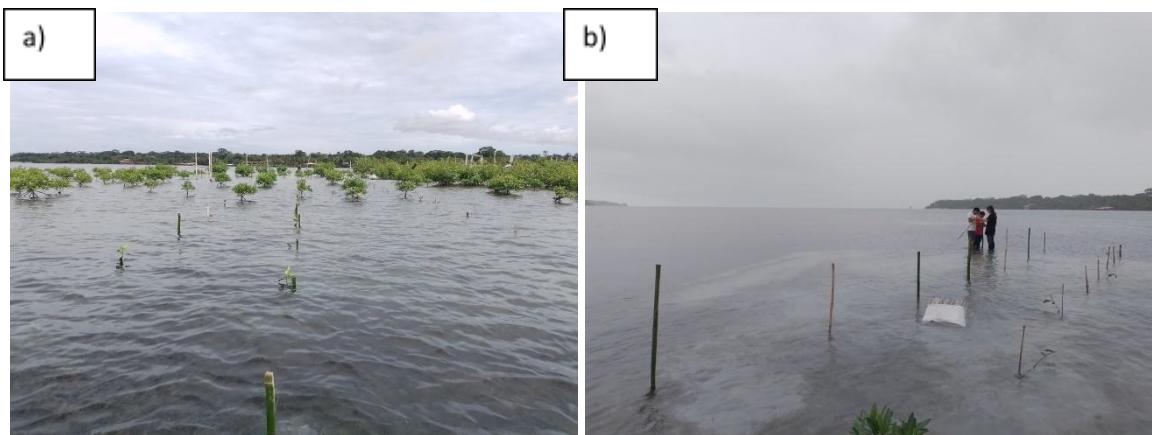


Figure 7. Placement of stakes for seedling planting location: a) 18/11/2022 01:38 p.m. N 09° 20.685', W 082° 14.370; b) 01/12/2022 12:26 p.m. N 09° 20.685', W 082° 14.370; b) activity carried out with students of the I.P.T. Agropecuario.

**Mooring of saplings:** To ensure that the saplings are not swept away and knocked over by the waves when the high seas arrive, the saplings were tied to the stake with a thread.



Figure 8. Process of tying seedlings to stakes: a) 18/11/2022 11:29 a.m. N 09° 20.685', W 082° 14.370; b) 02/12/2022 10:26 a.m. N 09° 20.685', W 082° 14.370

**Cutting of bamboo for stakes and arbours:** To establish the arbours for the birds on the islet and to establish the transects and planting points, bamboo was cut as raw material.

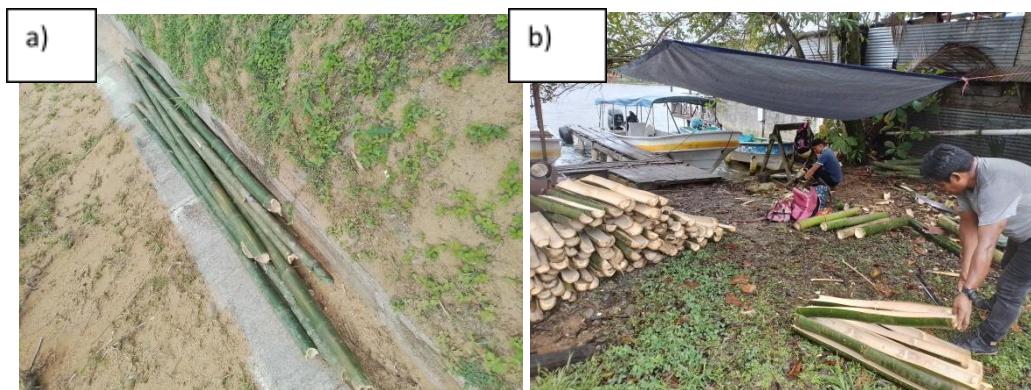


Figure 9. Cutting of bamboo for poles and stakes: a) 12/11/2022 11:22 a.m. N 09° 11.308', W 082° 19.414; b) 16/11/2022 12:25 p.m. N 09° 20.251', W 082° 14.217

### Relative germination and nursery survival

Species	Average relative germination	Survival
<i>Rhizophora mangle</i> (Red mangrove)	99.08	94.07

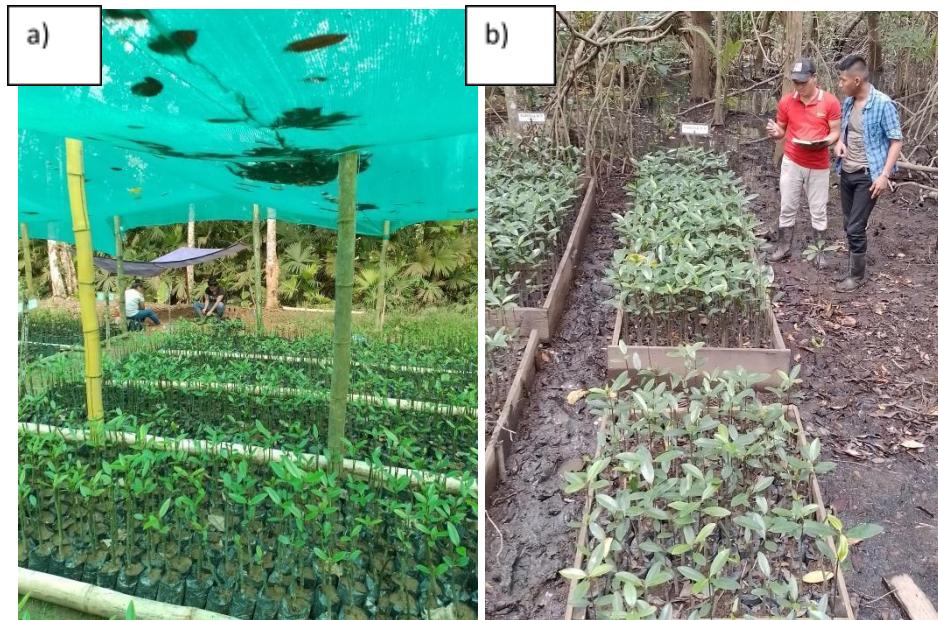


Figure 10. Seed germination in the nursery: a) 22/11/2022 09:37 a.m. N 09° 31.637', W 082° 35.727'; b) 24/11/2022 10:41 a.m. N 09° 11.524', W 082° 19.692'; c) 24/11/2022 10:41 a.m. N 09° 11.524', W 082° 19.692'.

## Trees planted to date

Species	Number planted	Quantity to be planted	Date	Replaced saplings
<i>Rhizophora mangle</i> (Red mangrove)	1,158	8 842	December 2022, last sowing.	4 in December.

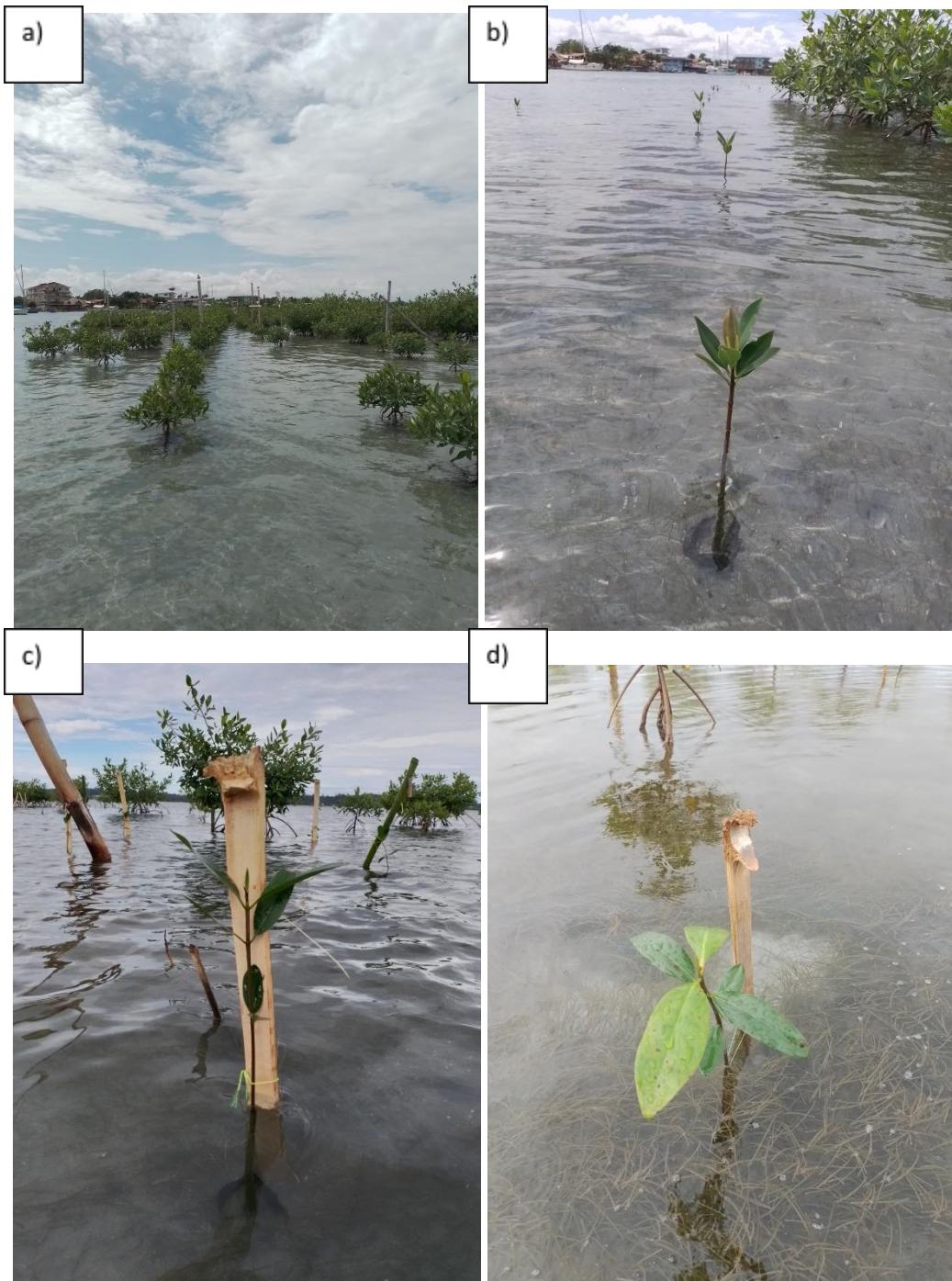


Figure 11. Status of trees already established in current and past reforestations: a) 18/11/2022 01:27 p.m. N 09° 20.685', W 082° 14.370; b) 18/11/2022 01:30 p.m. N 09° 20.685', W 082° 14.370; c) 17/11/2022 02:43 p.m. N 09° 20.685', W 082° 14.370; d) 01/12/2022 01:35 p.m. N 09° 20.685', W 082° 14.370

### Survival and mortality in the field (reforestation area)

Species	Survival rate	Mortality rate
<i>Rhizophora mangle</i> (Red mangrove)	90.5	09.5

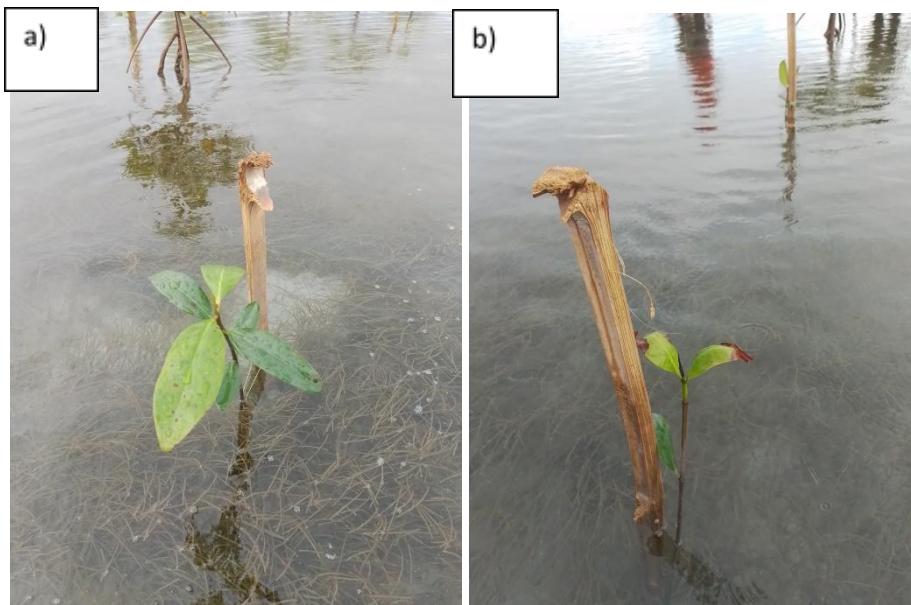


Figure 12. Survival and mortality status in the reforestation area: a) 01/12/2022 01:35 p.m. N 09° 20.685', W 082° 14.370; b) 01/12/2022 01:34 p.m. N 09° 20.685', W 082° 14.370

## Impacted area

Species	Sowing distance	Total area	Missing area
<i>Rhizophora mangle</i> (Red mangrove)	2m between plants and rows	4,632 m <sup>2</sup> , equivalent to 0.46 ha.	35,368 m <sup>2</sup> , equivalent to 3.53 ha.

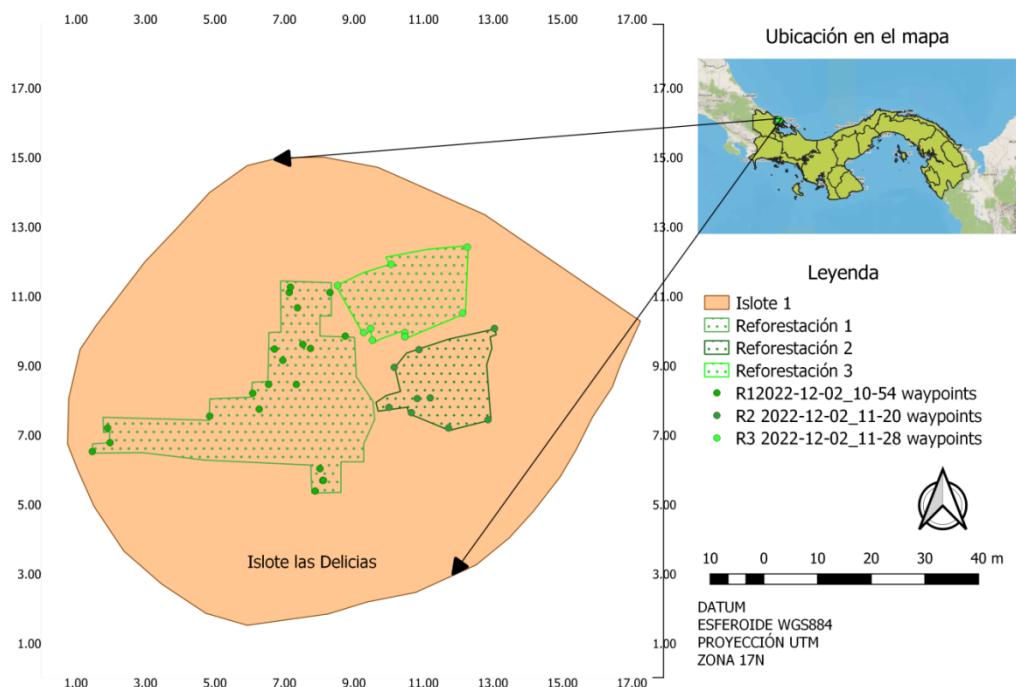


Figure 13: Geographical location of the reforestations carried out on the Islet.

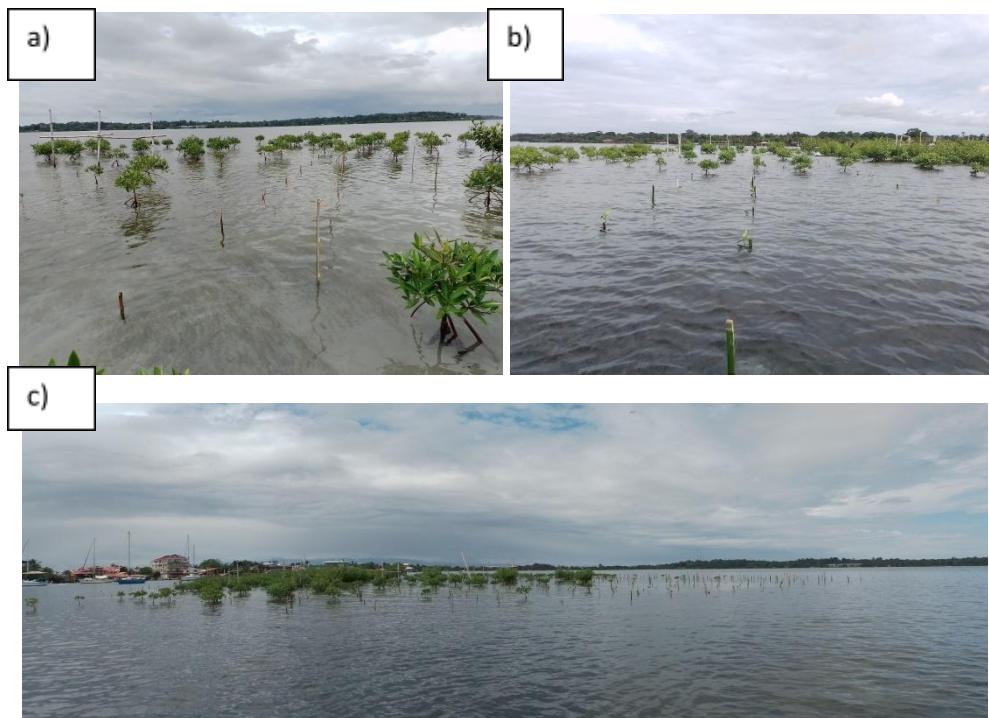


Figure 14: Area impacted in the reforestations: a) 17/11/2022 01:17 p.m. N 09° 20.685', W 082° 14.370; b) 18/11/2022 01:38 p.m. N 09° 20.685', W 082° 14.370; c) 02/12/2022 12:13 p.m. N 09° 20.685', W 082° 14.370

### Social activities carried out

Activity	Description
Reforestation	A group of university students from the University of Chiriquí (UNACHI), visited the Project to document the progress of the reforestation, recording a short film and the experiences of those in charge. This activity is important because it promotes the Project in the locality and the province, as well as promotes the conservation and restoration of the mangrove ecosystem. Approximately 30 people participated.
Reforestation	Sixth-grade students of the Centro Básico Bilingüe of Finca-32 and graduating students of the agricultural baccalaureate of the I.P.T.A. El Silencio visited the project; parents also participated. A reforestation day was held, the project was

	<p>presented at the local level, and a brief introduction was given about the research aspect of the project and its importance. Approximately 20 people participated.</p>
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Figure 15: Reforestations carried out: a) 17/11/2022 01:40 p.m. N 09° 20.685', W 082° 14.370; b) 17/11/2022 01:43 p.m. N 09° 20.685', W 082° 14.370; c) 02/12/2022 09:42 p.m. N 09° 20.685', W 082° 14.370; d) 02/12/2022 10:06 a.m. N 09° 20.685', W 082°



14.370; e) 02/12/2022 10:27 a.m. N 09° 20.685', W 082° 14.370; f) 02/12/2022 10:46 a.m.  
N 09° 20.685', W 082° 14.370

## Beyond Q4 2022

### 2023 first activities

#### February

Reforestation activities on the island on February 10th, 11th and 12th, rainy weather conditions were preventing field activities. 1500 saplings were planted.



On March 10th, 11th and 12th, 1000 more mangroves were planted.

