

Restoring Monarch's natural habitat

N°9

IN A NUTSHELL

Identity of the organisation

Organisation: Land Life Company

Website: www.landlifecompany.com

Contact: Arnout ASJES, Director, +316811622906,
a.asjes@landlifecompany.com

Site identity

Site: The Monarch Biosphere Reserve

Location: Zitácuaro, Mexico. The Monarch Biosphere Reserve is located in the Trans Mexican Volcanic Belt pine-oak forests, on the border of Michoacán and the State of Mexico, around 100km north of Mexico City.

Specificities: The reserve in Michoacán contains the highest elevations in the state, including peaks that reach 2,700 masl (metres above sea level). The climate is classified as being temperate and somewhat moist with a rainy season in the summer

Challenges: The Monarch Biosphere Reserve in the mountains of Michoacán is a designated UNESCO World Heritage site. Every autumn, an estimated 1 billion monarch butterflies arrive from Northern America to breed and spend the winter in the so-called 'Zona Nucleo', the core habitat of the Monarch butterfly species.

Status: The winter roosts in both Mexico and California were declared to be threatened phenomena by the International Union for the Conservation of Nature and Natural Resources (IUCN) in the IUCN Invertebrate Red Data Book.



Areas: Woodland area, mountainous environment

Action type: Creation of ecosystems/areas, Restoration or rehabilitation (towards the ecosystems historical trend or repairing key functions), species reintroduction, translocation

Action framework: Climate change adaptation

History and context

The Monarch's fiery orange and black wing pattern is instantly recognizable and reflected in childhood drawings around the world. This beautiful, large, and iconic species of butterfly has an extraordinary migration pattern, flying from Canada all the way to Mexico.

The Monarch butterfly © The Land Life Company

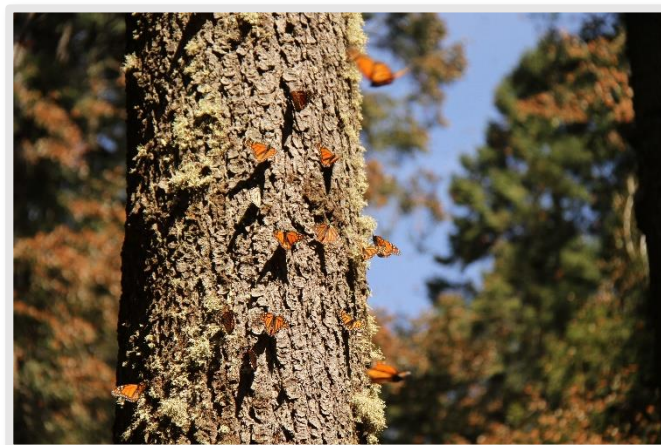


Having completed their mammoth journey, the Monarchs (*Danaus plexippus*) arrive in the hills of Michoacán, Mexico, where they settle down for a few months to rest and breed in the protected nature reserve. The livelihood of the Monarch butterfly depends entirely on the Oyamel tree, or *Abies religiosa*, that grows here. Several hundred million Monarch butterflies spend the winter clinging to these fir trees that protect them from the rain and chill throughout the winter months.

Today, the protected area where the Monarch butterfly can live and reproduce is under threat, with Oyamel trees illegally harvested by people who do not realize their immense value to the surrounding ecosystem. Also,

a major forest fire in 1978, followed by seasonal rains, washed away fertile soil. This has meant that hundreds of thousands of tree seedlings, planted in an effort to restore this area in the last 30 years, have died and natural restoration is not happening at a sufficient rate to fully restore the Monarch habitat. More recently, the trees have been attacked by a disease from a beetle. Climate change is also an important factor currently affecting monarch habitat.

The disappearance of the Oyamel forest is not only affecting the Monarch butterfly but the local communities that rely on the forest for their livelihood, water management, and protection. They are taking action and have started 24-hour surveillance to stop illegal logging, but still lack the funds or technical knowledge to restore the degraded lands surrounding their homes.



Monarch butterflies relying on the oyamel trees in the biosphere reserve to protect them from the winter chill. © The Land Life Company

Presentation of the project

Issues and objectives



Illegal harvesting of oyamel trees (*Abies religiosa*) and massive wildfires have resulted in severe degradation of these hilltop ecosystems. Restoring the Oyamel forests is crucial to ensure the species' survival. The reforestation of the Zona Nucleo (core habitat of the Monarch butterfly) started the first week of April 2016 with 10.000 seedlings. The seedlings used came from a local nursery (las novias del sol), operated by WWF.

Creation, restoration methods



The Cocoon is an incubator for tree seedlings, enhancing growth conditions towards tree establishment especially in primarily drier regions. The harsh conditions in these regions are hostile to vulnerable tree seedlings in particular, explaining the low survival rates in conventional plantings. The Cocoon stimulates deep rooting thus bridging the dry surface soil, and shelters shoot growth against excessive transpiration, together markedly increasing tree survival and performance. Once tapping into moister soil substrata, trees have become properly established, resulting in a strong and resilient tree, well prepared for an independent life.

The basic proposition is that no watering, inspection or maintenance is required post planting. The Cocoon consists of a donut-shaped water reservoir and lid, wicks and a tree shelter.

The water reservoir with lid is made of recycled cardboard and fully biodegradable materials (heat is applied in the process to promote hydrogen bonding between the paper fibres). Both parts are buried in the soil upon a one-off fill with water (~ 25 liters) while planting a small tree seedling in the middle. This water is trickled down just below the seedling's root ball using wicks. A paper based shelter is placed to protect the



Installation of the COCOON with local people © The Land Life Company

young tree shoot against high irradiation and desiccating winds as well as attack by small rodents. The Cocoon's lid prevents evaporation losses of the water stored inside, and keeps weeds away from the direct vicinity of the seedling, eliminating competition for water and light. As such stored water in the Cocoon is effectively used by the tree only.

The Cocoon dissolves completely in the soil. The only material that is left after this process is a very small

amount of nylon from the wicks that transport the water from the reservoir (The Land Life Company is currently working on options to use organic materials for this).

The tree seedlings used are preferably between 20-40 cm tall (typically 1 year old), with a limited number of leaves, to curb transpiration losses. Additionally, younger trees generally are less affected by undesired root girdling or J-rooting. As such, young trees, take deep roots upon planting, which enhances the tree's resilience during drought episodes. The seedlings, while growing tall, adapt to local windy conditions, resulting in firm stems. Obviously, there is a logistic and cost saving of not using continuous irrigation. Longer term, these trees are resilient against lack of irrigation water and are also less prone to diseases, especially when inoculated with mycorrhizae.



Installation of the COCOON with local people © The Land Life Company

Human and material resources



100 of workers participated in the planting. Donkeys, spades and picks were also needed. Planting a tree requires around 7 minutes. It took around 6 weeks to plant all the trees.

Monitoring and evaluation methods



After the initial 2-3 months, trees are excavated to measure the root system, in terms of width and depth. These analyses will be conclusive for the long term success of the tree. Once the roots are over 1 meter deep and spread widely in hair roots, the tree is properly established and will have a high chance of surviving longer term.

Control groups of 30 trees (with same treatment) at each location are planted to compare the survival rates and growth rates to the Cocoon. These trees will be watered once at planting, but not after that.

Ongoing monitoring can be completed through hiring local community members.

Tree vigor is a health indicator, also giving insights on survival rates. Survival rates during tree establishment in the first year can mainly be attributed to the Cocoon. Survival rates in subsequent years may clearly also be affected by extreme drought or other factors like grazing and fire, all beyond the scope of the Cocoon. Vigor is assessed by the following semi-quantitative scores during their normal growing period (1 - 3 years) (i.e. no vigor scores of deciduous species during fall and winter):

3	Healthy tree, with more than 75% of green, not wilted leaves. Also active growing points (apices) may be visible.
2	Affected tree, with 25-75% of the leaves being wilted, yellow or brown
1	Severely affected tree with less than 25% of the leaves being green (i.e. the majority wilted, yellow or brown)
0	Presumably dead tree with no or only wilted leaves. Trees, however, may still recover by resprouting after a rain event.

It is a very hard area to reach, on top of a mountain with no paved roads leading there. Especially in the rainy season it is almost impossible to get there. During the dry season someone is needed to go there on a horse, to manually count the number of survived vs dead trees that were planted.

Description

Partners



Land Life Company was on hand to help. Together with CONAFOR (Mexican Ministry of Forestry) and CONANP (Ministry of Protected Natural Areas), the local community and World Wildlife Fund (WWF), we kicked off the reforestation project in the first week of April 2016. By teaching the local farmers new planting

techniques we hope to help restore 100 hectares of degraded forest land, adding to the Monarch's precious habitat.

Costs and financing



A grant was received from the Dutch Postcode lottery. Cost per ha was between \$2000 - 3500.

Timetable



ACTION TIMETABLE

2016	2017	2018
Planting of 7500 trees	Planting of 2500	Monitoring and expansion to restore whole site

Overall assessment



The first plantings with the Cocoon resulted in an average of 93% survival one year after planting, as opposed to 3-5% that was achieved in previous decades, proving that we can ensure the survival of this iconic species for the coming generations.

Moreover, the local population has set up 24/7 surveillance of the area to stop illegal logging, and there is more and more awareness of the issues that this causes.

STRONG POINTS	WEAK POINTS
<ul style="list-style-type: none"> - high survival rates - protection of endangered species - local employment and pride - ecotourism 	<ul style="list-style-type: none"> - nylon wicks do not degrade fast

Perspectives

Continuation



The objective is to restore the entire monarch habitat. With EUR 3-5m, we can successfully restore the entire monarch habitat, ensuring the survival of this iconic species for the coming generations.

The company is working to get funding for follow-up projects to plant more trees and to educate the people about the importance of trees for the area and maybe convert it into an eco-tourism site.

Transposability



Globally, the Land Life Company has planted over 20 successful projects in the Middle East, USA, Mexico, South Africa, Spain and Australia.

➤ UNHCR – Re-greening and productive trees (fodder, medicine, fuel and food) planting in Minawao refugee camp in Northern Cameroon.

➤ UNICEF – Planting on an active mine site with UNICEF's Climate Ambassadors.

➤ ICBA, Dubai demonstration project. Testing of 3 native species for highway planting.

➤ Part of the "Un Nuevo Bosque" project in Mexico, revitalizing 3,500 hectares in a single day across all 35 states. Collaboration with CONAFOR, TV Azteca.

➤ European Union Greenlink project, restoring degraded ecosystems and planting productive trees (figs, pomegranate, nuts ao) in Greece, Italy and Spain by sustainably planting 30,000 trees with the Cocoon technology

➤ Highway restoration in California with Caltrans, reducing water use and improving survival rates for restoration of highway shoulders across the state

➤ Water conservation and ecosystem restoration of datacenter sites in California.

- Restoring UNESCO World Heritage site, the Galapagos islands with the Charles Darwin Foundation.

The Monarch Biosphere Reserve © The Land Life Company



Publications

.....

<http://magazine.landlifecompany.com/magnificent-monarch/>

Realized by:



With the financial support of:

**AGENCE FRANÇAISE
POUR LA BIODIVERSITÉ**
ÉTABLISSEMENT PUBLIC DE L'ÉTAT

and the technical support of
the French Ecological
Engineering Resource Centre:

