

113 年度氣候變遷創意實作競賽

創意企劃書

隊伍編號：028

隊伍名稱：衛家園

作品中文名稱：防護林集水器

作品英文名稱：SWC

參賽學校：明志科技大學

系所名稱：工業設計系

指導老師：李錯朮

團隊成員：劉音棋、吳昀蓁

1. 議題

由於沙漠化嚴重，人們的生活受到了影響，人們利用防護林來防止沙漠化的蔓延，而防護林的種植容易被牲畜或病毒感染，造成植樹困難。

Due to climate change and land overcultivation, land degradation and desertification, desertification will lead to the shrinking of sand and planting areas, and it is necessary to restore land deterioration by planting shelter forests, which can block sand and dust. The main thing is to prevent strong winds from damaging farmland, habitats and livestock. Protective belts are also used to stabilize the movement of sand dunes and stabilize soil structures.



2. 問題點

2-1 土地沙漠化問題

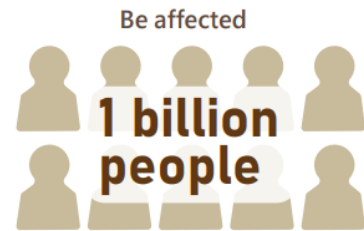
1. 10%至 20%的旱地已經退化。
2. 受沙漠化影響的土地總面積約 600~1200 平方千米。
3. 約 10 億人受到沙漠化威脅。



10 to 20% of drylands have been degraded.



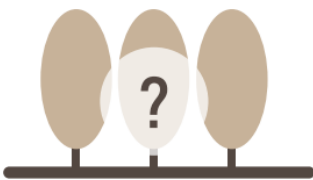
The total area of land affected by desertification is about 600 to 1200km².



About 1 billion people are threatened by desertification.

2-2 防護林問題

1. 無專為防風林樹木作為保護和供養的東西。
2. 需人力照顧防護林。
3. 在種植前期容易遭牲畜啃咬。
因為阿拉伯膠樹葉片較嫩，容易導致牲畜吃。



1. Nothing specifically for the windbreak trees as protection and offerings.



2. Manpower is required to take care of the shelterbelt.



3. It is easy to be bitten by livestock in the early stage of planting.

Because gum arabic leaves are tender, they can easily lead to livestock eating.

3. 設計理念

SWC 是一個保護防護林成長的集水器，主要為非洲撒哈拉沙漠的塞內加爾兒茶。可阻擋風吹倒還未長大的樹幹，並聚集少量露水和雨水在下方。當土壤水分不夠時，內側會擴散水分提供樹木生長。當樹幹茁壯時，產品就會分解回到土壤中。產品使用天然材料，約能使用 1~2 年。表面會塗上當地的印煉油，減少病蟲害接近，且產品的高牆可以保護幼樹不被牲畜啃咬。



Over-reclamation Human care Pest

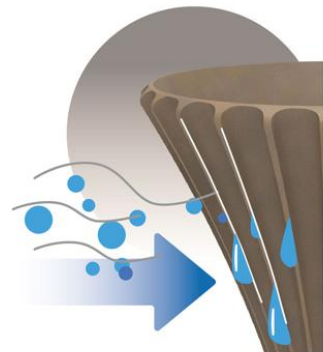
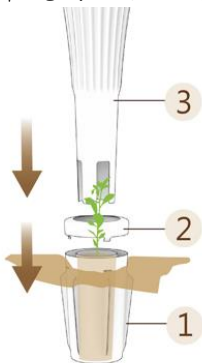
4. 使用流程

1. 首先把要種植的幼苗分成上面的花盆。
2. 當幼苗長到 15 釐米高時，移栽到土壤中。
3. 先挖一個 30*30*30cm 的坑，然後暴露在高溫下殺菌。



1. First divide the seedlings to be planted into the upper pot.
2. When the seedlings grow to 15 cm tall, transplant into the soil.
3. First dig a 30*30*30cm pit, and then expose it to high temperature as sterilization.

4. 依次放入集水區和防塵罩，然後放入高牆的上半部分。
5. 把土埋在這裡。
6. 由於早晚的溫差，露水凝結在盆栽植物上半部分的外部。

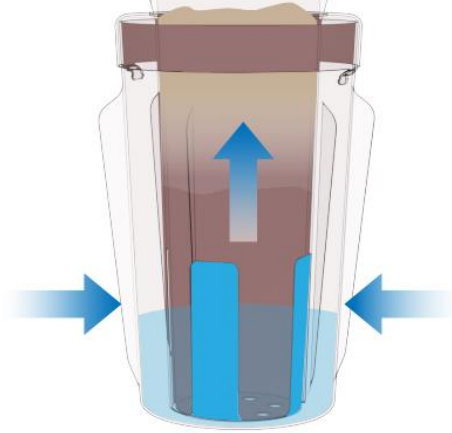


4. Put in the water collection area and the sand dust cover in order, and then put in the upper half of the pot.
5. Bury the soil here .
6. Because of the temperature difference between morning and evening, the dew condenses on the outside of the upper half of the potted plant.

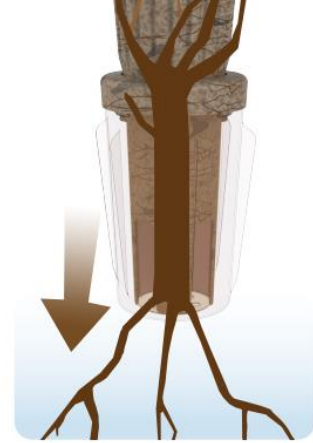
7. 露水會沿著弧線滑到水槽裡。
8. 當土壤中水分飽和度不相同時，水分子會通過水分擴散帶傳遞水分給植物生長。
9. 當根系需要擴大水源時，集水區的底部較薄，根系可以向下生長以突破底部。



7. The dew will slide down along the arc into the sink except for the direction.

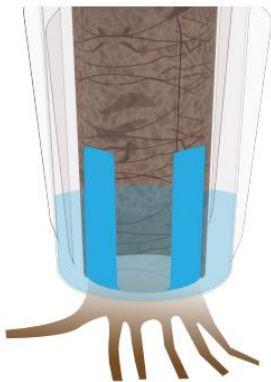


8. When the saturation of water in the soil is not the same, the water molecules will transmit water through Moisture diffusion zone to feed plant growth.



9. When the root needs to expand the water source, the bottom of the upper half of the pot is thinner, and the root can grow downwards to break the bottom.

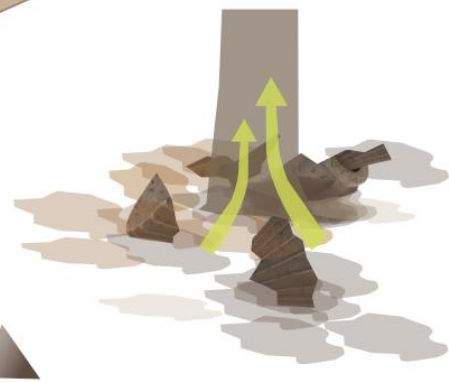
10. SWC 不會因為根部突破盆栽的上半部分而影響供水。
11. 高牆是為了防止牲畜咬它，苦油可以防止昆蟲侵擾樹木。
12. 當樹幹的直徑超過 SWC 的寬度時，SWC 會逐漸分解，為樹木提供養分。



10. The water collection tank will not affect the water supply because the root breaks the upper half of the potted plant.



11. The height of the outer layer is designed to prevent livestock from biting it, and the application of bitter oil serves to prevent insect infestations.

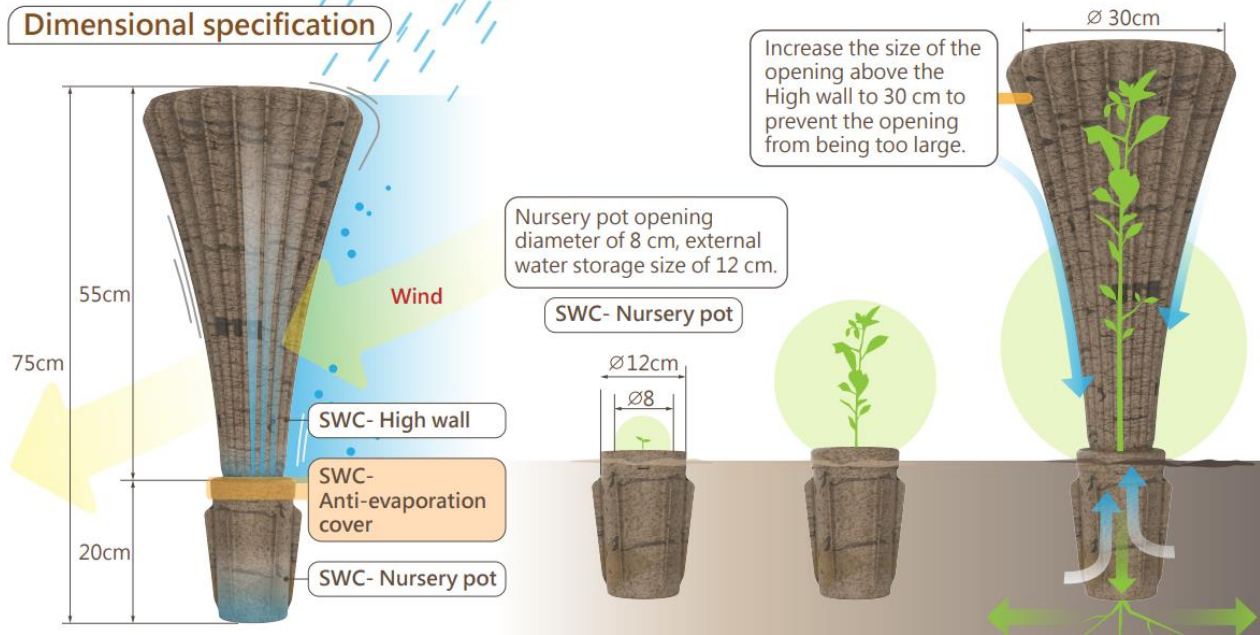


12. When the diameter of the trunk exceeds the width of the SWC, the SWC will gradually decompose and supply the tree with nutrients.

5. 尺寸說明

整個產品有 75 公分高，Nursery pot 種植區域的開口為 8cm 儲水區為 12 公分，當移植後會加上 High wall 開口直徑有 30cm。

Dimensional specification

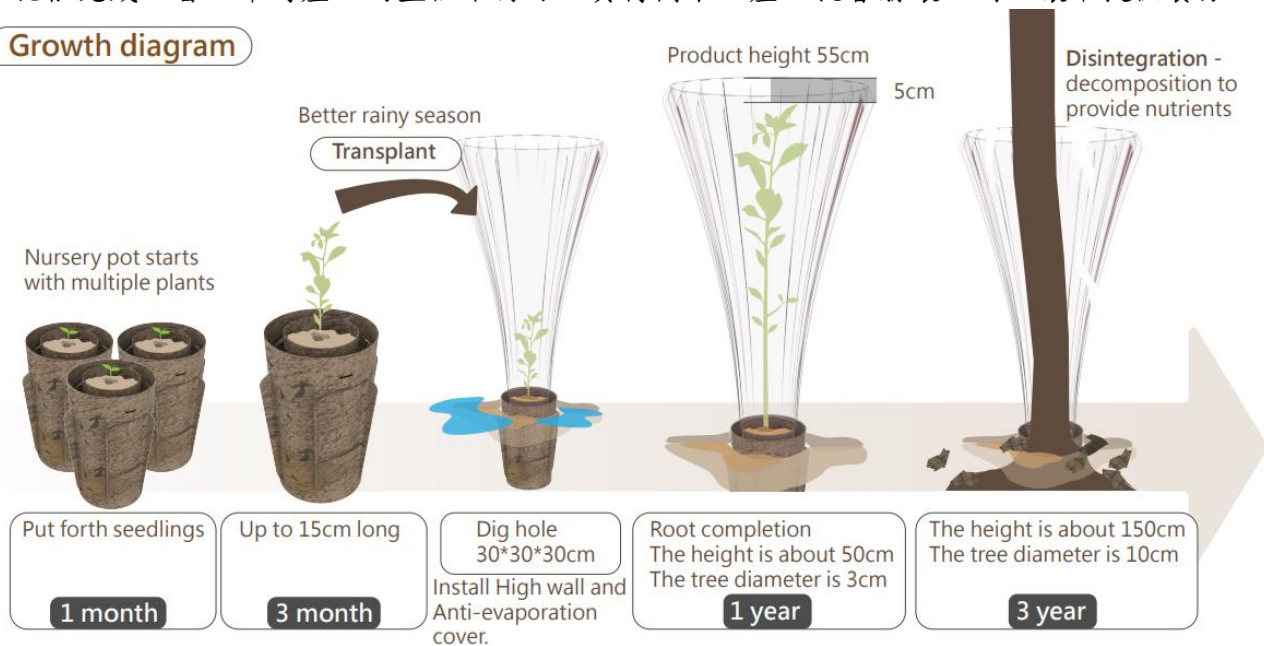


6. 產品關係圖

前期在 Nursery pot 裡面進行多棵種植，3 個月後差不多可進行移植。

1 年後樹木高約 50 公分，樹徑約 3 公分，SWC 高度至少可以保護它生長一年，並且此時樹木已經扎根完成，當三年時產品的直徑不再可以負荷樹木，產品就會崩壞，到土壤中提供養分。

Growth diagram

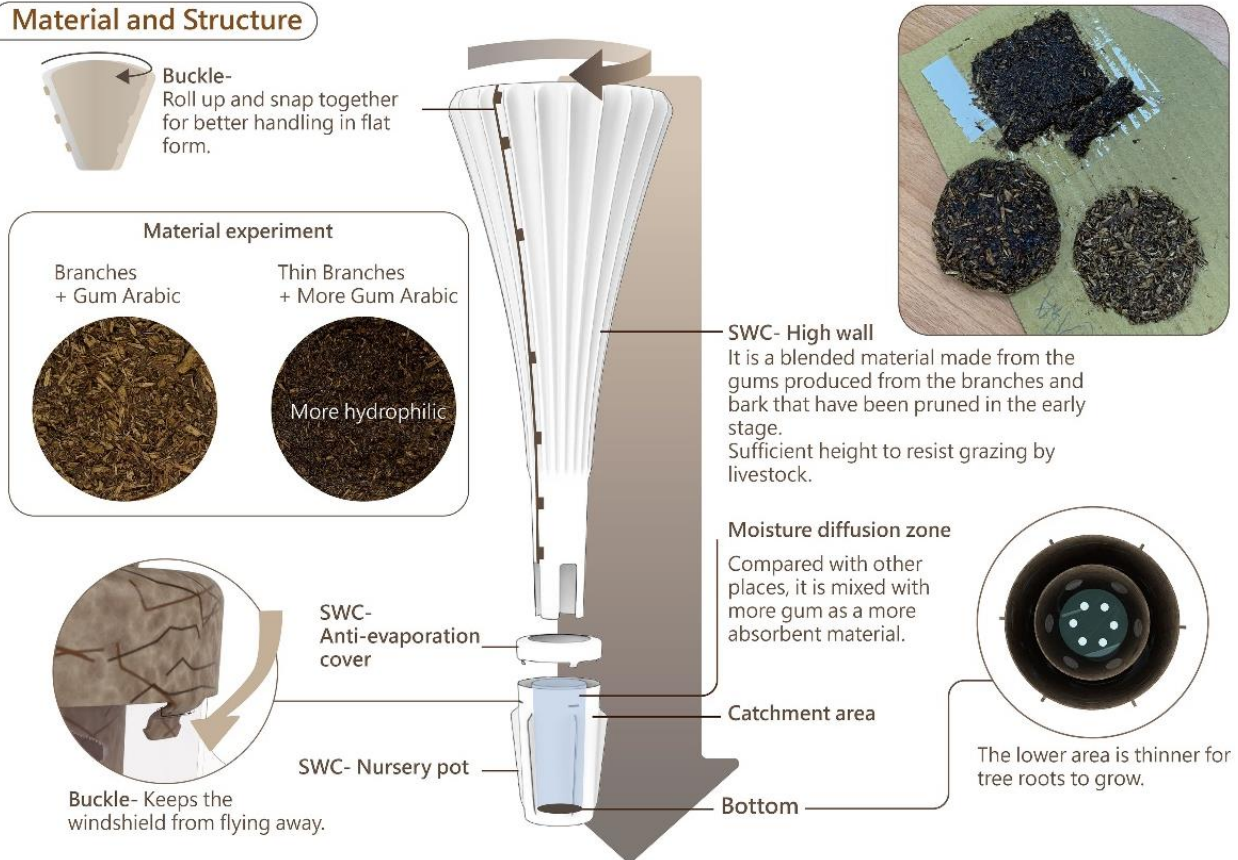


7. 結構說明

上方的 High wall 是扣合環繞成一圈的，攤開成平面更方便運輸。Anti-evaporation cover 是可以防止水份蒸發。並且放置時可以扣合 Nursery pot 防止飛走。

下方的 Nursery pot 中間內測的材質是親水區域，可讓水分從儲水區擴散到樹根，最下面的底部較薄可讓樹根好衝破。

Material and Structure



8. 材料說明

材料使用 Gum 和 Neem oil。Gum 來自樹木本身會產生的膠，來提供產品整個的親水性比例，和製成的黏性。Neem oil 也是從當地附近的樹木取得的，可驅蟲防止樹木生病。

Gum



The glue is hydrophilic and can be used for water transport.

Gum in the bark, which is hydrophilic, acts as a glue, and the compound agent doesped the fibers of the branches as a material, and increases gum in different proportions, which can be used as a part for transporting water.

Neem oil

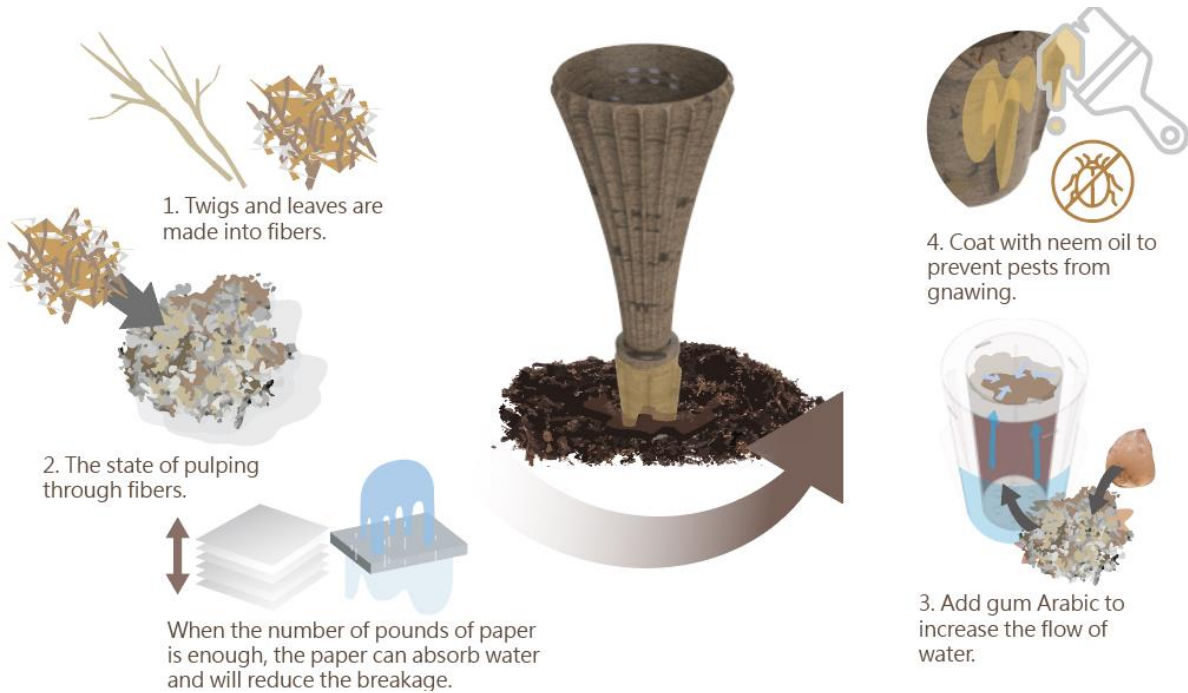


Can be dewormed.

Azadirachtin reduces insect feeding and acts as a repellent. It can also interfere with insect hormone systems, making it harder for insects to grow and lay eggs. Grown in Ghana, Africa, it can be used as a coating on products to reduce gnawing by diseases and insects.

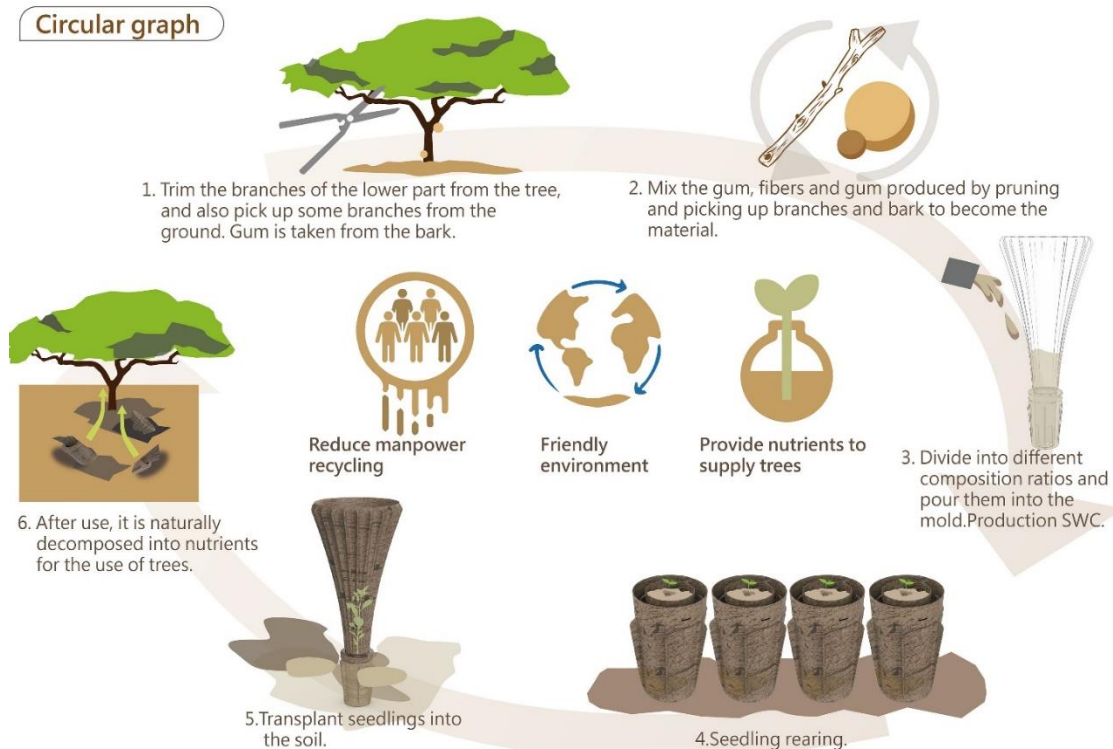
9. 製造流程

製造過程會取得樹木樹枝、豆莢和 Gum，進行不同比例的調和，產生類紙張的效果，灌製模具形狀。下方需要擴散水分的區域會加入更多的 Gum 來讓水分更好傳遞，整個模具產生後會在外層塗上 Neem oil。



10. 產品循環圖

從樹木取下天然材料，進行生產。放入種子開始培育，移植到土壤中，最後分解提供養分給樹木。整個過程降低人力消耗和提高樹木的存活率。



11. 預期效益

永續 SDGs 符合 12 和 13 項，提供永續的製程和減緩氣候變遷。



12. 市場規模

在非洲的綠色長城計畫，因為現在計畫種植綠只達到 20%。

