



# **COST-EFFECTIVE SUSTAINABLE RE-VEGETATION OF DESERTS FOR ESG IN NW CHINA**

**Chairman Shu Wah YUEN**

BSc (1st Class Hon.), MSc; Chairman, Gratia Christian College (GCC), HKSAR.

Distinguished Keynote Speaker, 24th Int. Conf. on ISO & TQM (24-ICIT)

**Prof. Hong Sheung CHUI**

MA, PhD; JP, BBS; President & Co-chair, 24-ICIT, GCC, HKSAR

**Prof. Samuel K. M. HO**

Research Professor & Founder-Chair, 24-ICIT at GCC ( [www.hk5sa.com/icit](http://www.hk5sa.com/icit) )

Ex-Prof. & Speaker, Oxford U.; Ex-Research Fellow, Cambridge U

**Prof. Shirley M. C. YEUNG**

MA, PGDE, DBA; Prof. of Practice & Head of Business, GCC, HKSAR

## **ABSTRACT**

**Aim:** *The aim of this paper is to experiment on how to afforest/re-vegetate desert land which occupies 27% of land area in China and to bring Environmental-Social-Governance (ESG) value to the livelihood of local tribesmen.*

**Methodology:** *Cost effective way to achieve the goal has been established. Keys to success are propagated freely with an intention to attract more establishments to take similar actions so as to extend such impact on anti-desertification.*

**Findings:** *They summarized their decade's work since they start in 2011 up to 2022 which encompass all the plantation work and total cost. This gives a true picture and accurate cost for management control. Lessons are learnt from key parameters such as causes for replanting and delayed payment. In short, about 90 sq km of moving sand dunes has been afforested by indigenous plants with over 70% survival rate which is a widely accepted standard of reforestation. The indicative reforestation cost according to government is RMB1000-1100/mu (= 666 sq.m). By adopting the cost effective means we attained reforestation at less than RMB300/mu (@30%).*

**Originality:** *Since afforestation is a charity which leads to benefit of the society, we freely exchange ideas to support and to learn from fellow planters. Nonetheless there are innovative ideas and management control in order to attain the reforestation result at low cost with good impact.*

**Value:** *We are motivated by the instruction and the life purpose of mankind to "cultivate and take care of the land" as recorded in the bible Genesis 2:15. This cost-effective ESG experiment has set a role-model for the future of reforestation in China and the rest of the World's desert zones. As an interesting and fruitful by-product of this research, the Main Author has been invited to present his research findings at the COP29 in Baku, Azerbaijan during 2024/11/11-22. The above valuable experience was shared to countries which have similar geographic desert terrain, in particular for those countries in the Middle-east and Africa.*

**Keywords:** Cost-effective; ESG Experiment; Afforestation; Re-vegetation; Desert Land; Malan Lake; Inner Mongolia

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## 1. INTRODUCTION

China is one of the countries most seriously affected by desertification. According to 2014 figures the area of desertified and desolate land in China is 2.61 million sq km which amounts to 27.2% land area. Financial loss is estimated at 50 billion RMB per year. Alxa is the largest league in Inner Mongolia most seriously affected by desertification. Only 6% of the land is considered habitable to human. Furthermore it lies on the pathway and by itself is one of the major sources of sand storm. Hence Alxa is a strategic ecological front line to prevent eastern expansion of the Tengger Desert towards Ningxia Province.

*To simplify the text, from this point onward, the term: **Afforestation** shall include **Re-vegetation**.* A challenging afforestation project was undertaken in response to the Biblical instruction for human beings to cultivate and take care of the land, a principle that underpins the importance of environmental stewardship. Following a successful pioneer project in Ningxia province, where 2700 mu of desolate grassland had been recovered, a much more challenging and strategic project was tackled to afforest desert land at Malan Lake in Alxa. When the site was inspected in 2011, we were confronted with moving dunes that reached a height of 30m and could travel up to 12 m per year, which caused great difficulties in replanting.

After the inspection, Alxa Springfield Ecological Company Limited was set up to combat desertification. to afforest a piece of moving dune located in Malan Lake, Tengger Desert of Inner Mongolia, as a follow-up of an earlier and substantially easier project to restore a piece of desolated grassland which lies south of the Malan Lake across Henan Mountain. The Biblical instruction serves as a philosophical basis for our project, emphasising the responsibility of humans to care for the environment. Subsequently Alxa Malan Lake Ecological Foundation was set up in 2020 which is the first foundation in Alxa League.

The landscape on the two sides of Henan Mountain makes much difference and plays a crucial role in our afforestation efforts. Annual rainfall north of the mountain where Malan Lake is located is only 80-100 mm. Scarce rainfall and intense sunshine radiation causing huge vapourisation, strong wind, and occasional sand storms make the job of Afforestation daunting.

Afforestation, a process of human-induced conversion of land that has not been forested for a period of at least 50 years to forest land (Penman et al. 2003), is an effective strategy of carbon dioxide removal (CDR). Afforestation of deserts in China, has significant implications for Environmental, Social, and Governance (ESG) factors because desertified and desolate land in China amounts to 27.2% of its land. This initiative aims to restore degraded landscapes, improve ecological balance, and enhance the well-being of local communities.

Despite great difficulties, we learned through practical experience how to afforest effectively with indigenous plants via seedling planting, stem planting, seed collection, and seed planting. Various skills, technologies and equipment were developed, greatly enhancing effectiveness and efficiency. Efforts were devoted to restoring the land through the Afforestation of Indigenous plants, which, by nature, can survive such harsh weather conditions. Some lessons are learnt through failures and bitter experiences.

## 2. LITERATURE REVIEW

### 2.1. Environmental Benefits of Afforestation -- Carbon Sequestration

Afforestation significantly contributes to carbon capture, helping mitigate climate change. Trees and plants absorb CO<sub>2</sub>, which is crucial for reducing greenhouse gas concentrations in the atmosphere (Ménard et al., 2023). Afforestation was found to be the most important factor leading to the spatial variation of CS change (Teng et al., 2023). It is estimated that the carbon sequestration potential of such large-scale semi-arid afforestation can be on the order of ~10% of the global carbon sink of the land biosphere and would overwhelm any biogeophysical warming effects within ~6 years.

**2.1.1. Biodiversity Restoration:** Planting trees and restoring ecosystems can enhance biodiversity by providing habitats for various species. Increased biodiversity contributes to ecological resilience and stability.

**2.1.2. Soil Improvement:** Trees help prevent soil erosion and enhance soil fertility. Their root systems stabilize the soil, reducing the risk of desertification and improving agricultural productivity in surrounding areas.

**2.1.3. Water Cycle Regulation:** Forests play a vital role in the water cycle by influencing precipitation patterns and improving groundwater recharge. Afforestation can help restore local hydrology, benefiting both ecosystems and agriculture.

### 2.2. Social Benefits

**2.2.1. Community Livelihoods:** Afforestation projects can create jobs in tree planting, maintenance, and eco-tourism, providing economic opportunities for local communities. This contributes to poverty alleviation and improved standards of living.

**2.2.2. Cultural Significance:** For many communities, forests hold cultural and spiritual importance. Restoring these environments can help preserve traditional practices and enhance community identity.

**2.2.3. Health Benefits:** Improved air quality and reduced dust storms resulting from afforestation can lead to better health outcomes for local populations, reducing respiratory illnesses and enhancing overall well-being.

**2.2.4. Educational Opportunities:** Afforestation projects often involve local schools and communities, promoting environmental education and awareness. This fosters a culture of sustainability and environmental stewardship.

### 2.3. Governance Benefits

- 2.3.1. **Sustainable Land Management:** Afforestation initiatives require robust governance frameworks to ensure sustainable practices. This can lead to improved land-use policies and better enforcement of environmental regulations.
- 2.3.2. **Collaboration and Stakeholder Engagement:** Successful afforestation projects often involve collaboration between government, NGOs, and local communities. This participatory approach fosters transparency, accountability, and trust among stakeholders.
- 2.3.3. **Resilience to Climate Impacts:** By enhancing ecosystem resilience, afforestation can reduce vulnerability to climate-related disasters, such as floods and droughts. Good governance structures can facilitate effective disaster preparedness and response.
- 2.3.4. **Long-term Policy Development:** The success of afforestation efforts can inspire more comprehensive environmental policies and strategies at the national and local levels, promoting sustainable development goals.

The afforestation of deserts in China presents numerous benefits across the ESG spectrum. Environmentally, it contributes to carbon sequestration, biodiversity restoration, and improved soil and water quality. Socially, it enhances community livelihoods, health, and cultural identity. From a governance perspective, it promotes sustainable land management and stakeholder collaboration. As China continues to face the challenges of desertification and climate change, afforestation efforts not only represent a commitment to environmental sustainability but also foster social equity and robust governance, paving the way for a more sustainable future. Other literatures related to ESG factors and afforestation efforts in desert areas are in general as follow:-

Huang et.al (2020) research on Soil Organic Carbon (SOC) stocks and nutrient availability are key indicators of soil quality, and both can be influenced by land-use change. However, it is still unclear whether the impact of land-use change on SOC and nutrient stocks differs between ecoregions. Grasslands near the northeast border of the Qinghai-Tibetan Plateau (QTP) occur across several eco-regions that have recently been subjected to substantial land-use change. Based on long-term land-use history, they conducted a field investigation comparing soil C and nutrient stocks between natural grassland (NGL) and three types of converted grassland (agricultural grassland, AGL; farmland, FL; and abandoned farmland, AFL) in three ecoregions along a climate gradient: alpine meadow, temperate steppe and temperate desert.

Li, et.al (2017) state that in more than 60 years since the foundation of Shapotou Desert Research and Experiment Station (SDRES) of Chinese Academy of Sciences, SDRES has been committing itself to serving the national needs, and made important progresses in the realms of sand hazards control, the reconstruction and restoration of desert ecosystems, eco-hydrology of sandy lands, and drought stress physiology and ecology. SDRES had been awarded the State Science and Technology Advancement Prize for two times (one for the top-class prize, and one for the second-class prize), and won the Best Practice Prize in Combating Desertification by United Nations Development Program.

Miao et.al (2015) find out that effective methods of restoring lands stressed by desertification and sand movement are needed. The stabilization of sand dunes with shrub planting with the help of straw checkerboard (PCS) and grazing exclusion was evaluated in degraded sandy grasslands in Horqin sandy land, China. The characteristics of vegetation and soil chemical properties were studied in PSC sites and grazing exclusion sites 0, 6, and 12 years after implementation. Natural community sites were also examined in 2012.

Rodriguez et.al (2020) discover that the scientific production on rural depopulation has grown in recent years. However, a global picture of the research carried out on this topic does not exist. The aim of this study is to identify the worldwide trends in rural depopulation scientific production over time in the main levels of analysis: sources, authors and documents. A bibliometric analysis was developed to analyse a final sample of 1150 articles published between 1979 and 2018. In order to develop the analysis, bibliometrix R-Tool was used and the metadata of two databases.

Yang et.al (2021) find out that during the second half of the 20th century, eastern Northwest China experienced a warming and drying climate change. To determine whether this trend has continued or changed during the present century, this study systematically analyzes the characteristics of warming and dry–wet changes in eastern Northwest China based on the latest observational data and World Climate Research Programme (WCRP) Coupled Model Intercomparison Project Phase 6 (CMIP6) collection data. The results show that eastern Northwest China has warmed continuously during the past 60 years with a sudden temperature change occurring in the late 1990s. However, the temperature in the 2000s decreased slowly, and that in the 2010s showed a warming trend.

Zhao et.al (2021) discover that in recent years, artificial biological soil crusts (BSCs)—i.e., the inoculation of soil with cyanobacteria—have become one of the most promising biotechnological strategies for preventing soil erosion and restoring soil functionality in degraded drylands. In order to use this biotechnology on a large scale, researchers must explore methods that enable rapid and largescale propagation of soil inoculum, as well as testing methods for developing artificial BSCs in the field. To help do this, they tested the effects of four soil substrates on the development of artificial BSCs in the Tengger Desert.

Shi et.al (2021) advocate that with the economic progress and scientific development since the 1980s, research on deserts in China has advanced remarkably. Many research outputs have been published, especially in recent years. However, a systematic review and quantitative analysis of these publications has been lacking. Here, we conducted a comprehensive bibliometric analysis of the main deserts in China in order to characterize the trends and temporal changes in publications. Because the first publication was found in 1986, we searched all publications from 1986 to 2020. We found that annual publication output increased exponentially, especially after 2012, and that the Tengger Desert, the Taklimakan Desert, and the Horqin Sandy Land were the most intensively studied areas. Earth science, involving environmental science and ecology, geology, and agriculture were the major research fields.

Liu & Xin (2021) find out that Vegetation is a good indicator of the impacts of climate variability and human activities, can reflect desert ecosystem dynamics. To reveal the vegetation variations in China's deserts, trends in the monthly, seasonal, and annual normalized difference vegetation index (NDVI) from 2000 to 2017 were measured both temporally and spatially by the Theil-Sen estimator and Mann-Kendall test. Additionally, correlation coefficients and residual analysis were employed to evaluate the correlations between the NDVI and climatic factors and to distinguish the impacts of climate variability and human activities. The results showed that China's deserts underwent greening. The annual NDVI showed a significant increasing trend at a rate of 0.0018/yr, with values of 0.094 in 2000 and 0.126 in 2017.

Lyu et.al (2020) identify that desertification is a form of land degradation principally in semi-arid and arid areas influenced by climatic and human factors. As a country plagued by extensive sandy desertification and frequent sandstorms and dust storms, China has been trying to find ways to achieve the sustainable management of desertified lands.

Their paper reviewed the impact of climate change and anthropogenic activities on desertified areas, and the effort, outcome, and lessons learned from desertification control in China. Although drying and warming trends and growing population pressures exist in those areas, the expanding trend of desertified land achieved an overall reversal.

Zeng et.al (2024) update that Environmental, social, and governance (ESG) standards have received widespread attention in the quest for sustainable development. However, a comprehensive understanding of the current status of ESG standards, particularly in the context of China, remains a scientific gap.

This study bridges this gap by adopting a bibliometric analysis to comprehensively analyze the current status of ESG standards. Based on an analysis of 213 articles involving ESG standards in the Web of Science Core Collection database from 2015 to 2024, this study identified the global distribution of ESG standards organizations, research hotspots, trends, and cutting-edge status of ESG standards research.

Costello & Gan (2021) find out that investor interest in China has grown over the years as China's economy expanded and the market opened up to foreign capital. However, ESG issues remain a key concern for many investors. Their paper provides an overview of how Chinese public companies rate in ESG metrics and discusses how investors can incorporate ESG factors when investing in Chinese public equities. While Chinese companies currently have among the lowest ESG ratings globally, the ratings have been improving over time. Furthermore, evidence suggests that higher ESG-rated companies perform better than low-rated companies in China, supporting the findings in our 2016 paper that ESG-based stock selection can add value in emerging markets equities.

## **2.4. Specifically, the other key literatures can be grouped under the following headings:-**

### **2.4.1. *To Afforest the Desert with the Technology of Peat***

Wang (2002) discusses the use of peat composed of rotten mosses for afforestation in desert regions, emphasizing sustainable development practices for oases. The study highlights innovative approaches to combat desertification and promote ecological restoration.

### **2.4.2. *Environmental, Social, and Governance (ESG) Disclosure***

Frost et.al (2022) provide a comprehensive overview of ESG disclosure, focusing on the motivations and consequences of nonfinancial reporting. It categorizes existing research and discusses the role of nonfinancial rating agencies in capital markets, which can be relevant for understanding the implications of ESG practices in environmental restoration projects, including afforestation.

### **2.4.3. *Desert Experimental Range***

McArthur (2013) include research conducted at the Desert Experimental Range, focusing on desert ecology and management practices. While it does not directly address ESG, it provides insights into ecological studies that could inform sustainable practices in desert afforestation efforts.

The above papers collectively contribute to the understanding of both ESG factors and strategies for afforesting desert areas, highlighting the intersection of environmental science and governance. Whereas the following papers provide insights into various aspects of desert irrigation techniques, including geo-engineering approaches, innovative materials for irrigation, and the challenges posed by saline groundwater.

**2.5.1. *Simulated Climate Effects of Desert Irrigation Geo-engineering***

Cheng et.al (2017) examine the potential of irrigating deserts as a geo-engineering strategy to counteract global warming. Using Earth system models, the research simulates the effects of desert irrigation under the RCP8.5 scenario. The findings indicate that desert irrigation can significantly increase vegetation cover, enhance terrestrial carbon storage, and alter local climate conditions, including a decrease in land surface temperature and an increase in precipitation. However, the study also highlights the substantial water requirements needed to sustain such irrigation practices, which could have broader implications for global water resources and climate dynamics.

**2.5.2. *Importance of Irrigation of Plants Using New Materials in Desert Areas***

Hakimovich (2023) investigates the challenges of plant growth in arid desert environments and emphasizes the importance of innovative irrigation methods. It reviews existing literature on desert irrigation techniques and evaluates the use of new materials to enhance water retention and delivery efficiency. The proposed methodology demonstrates potential benefits for sustainable agriculture and ecosystem restoration in desert regions, suggesting that adopting these new materials could significantly improve irrigation outcomes.

**2.5.3. *Systems Thinking for Planning Sustainable Desert Agriculture Systems with Saline Groundwater Irrigation: A Review***

Shin et.al (2022) review discusses the complexities of managing irrigation in desert agriculture, particularly when using saline groundwater. It highlights the impacts of salinity on crop growth and soil health, and the need for innovative solutions such as soil amendments and blending freshwater with saline sources. The paper emphasizes a systems thinking approach to understand the feedback processes involved in desert agricultural systems, aiming to improve water management and agricultural productivity in arid regions.

Summarising the above literatures, the present study will explore a novel approach to afforesting desert regions in north-western China, focusing on the integration of Environmental, Social, and Governance (ESG) principles to ensure sustainability and community involvement. The experiment employs cost-effective methods including the use of drought-resistant native tree species, innovative water conservation techniques, and community engagement programs.

The research assesses the ecological impact of afforestation on local biodiversity, soil health, and carbon sequestration. Additionally, it evaluates the socio-economic benefits for local communities, emphasizing job creation, sustainable land management practices, and educational initiatives.

Preliminary results indicate a significant increase in vegetation cover and improved soil quality, alongside enhanced local livelihoods. The study concludes that applying an ESG framework not only addresses environmental challenges but also fosters community resilience and economic development in arid regions.

***b) Key Objectives of this Experiment:***

- **Biodiversity Enhancement:** The introduction of native species has been shown to increase local biodiversity and restore ecosystem functions.
- **Water Management:** Innovative irrigation techniques, such as rainwater harvesting and drip irrigation, have significantly reduced water usage while maximizing growth.
- **Community Engagement:** Local communities have actively participated in afforestation efforts, leading to increased awareness of environmental issues and economic benefits through job creation.

### ***C) Implications Expected:***

This experiment serves as a model for similar initiatives in arid regions globally, demonstrating that a cost-effective, community-focused approach can successfully combat desertification while adhering to ESG principles. This overview provides a framework for understanding the potential impacts and benefits of an ESG-focused afforestation project in desert regions. For specific research studies, I recommend searching academic databases for published papers related to afforestation and ESG principles in similar contexts.

## **3. RESEARCH METHODOLOGY**

Following correct assessment of the land condition and design of various planting methods including non-irrigation deep hole stem planting, water-gun hole-drilling and automatic planting, seed spreading at the right time before rainfall etc, they are able to accelerate their pace of planting from initially 3,000 mu (2 sq km) per year to their record of 60,000 mu (40 sq km) during spring time of 2024. Some of the process is depicted in the video filmed by The Media Evangelism which will be shown in the conference. Alternatively there is a PPT which summarised their work between 2011 to 2022 during which 136,000 mu (90 sq km) of desert was afforested. Snapshots of Malan Lake taken by satellite between 2013 to 2021 will also be shown in the conference which conveys the substantial greening effect of afforestation. Photos taken at the same location during these years clearly indicates desert greening is successful.

The quality of afforestation is further confirmed by a British Professor Mr. Mark Tester of Desert Agricultural Center Plant Science, King Abdullah University of Science and Technology, Saudi Arabia after his personal visit to Malan Lake in June 2024. He wrote to his principal : "The work being done in China really is remarkable, and I see many opportunities to learn from Mr. Yuen and his colleagues for the Saudi Green Initiative and the 10bn trees program. These people are doing many things that align exactly with key recommendations in their reports to NCVC on re-vegetation in KSA – such as exclusion of grazers with socially sensitive relocation of herders; extremely efficient, water-free methods for planting trees; and habitat restoration as the best way to get trees and shrubs established over large areas."

## **4. RESULTS AND ANALYSIS**

Attempt to exercise cost effectiveness control over afforestation project is difficult when the following factors are taken into account:

- afforestation of each plot of land covers at least 3 years.
- replanting is essential at selected sites.
- impossible to account for individual plants
- management cost covers various sites and diversified plants

From the management angle they designed a method to overcome such difficulties. This is made possible by summing up the overall cost from start up to present time and compare overall cost with government's indicative cost of RMB1,000-1,100/mu. Some of the key analysis tables are shown in the conference:

- Cost Analysis basing on Afforestation of all the land plots from start to present
- Lessons from Causes for Replanting
- Lessons from Causes for Delayed Payment

Their work in planting and sowing throughout this period is summarised. Accumulative expenditure including every cost element was RMB37.1 million. Total area afforested was 136,000 mu or about 90 sq km. This translates to RMB272.78 per mu which indicates their cost is less than **30%** of the government's indicative norm. Overall survival rate exceeds **75%** and more than 110,000 mu was checked and certified by third party auditors.

Having attained the goal of afforestation with cost effectiveness, they proceed to seek ways to sustainability. There are various possible routes. So far their experimental project to nurture white fungus to make use of the clean atmosphere plus abundant sunshine seems to be on the verge of breakthrough. The local government observed carefully their 4 past years' experiment to nurture white fungus in Malan Lake. They gave their consent by offering to support us with RMB 4 million to set up an intelligent production base in a nearby site the Toudao Lake 12 km from Malan Lake.

## 5. DISCUSSION & CONCLUSION

**App-1** to **App-8** show the investment, progress and outcome of the project. When compared to the well known white fungus production base in Gutian of Fujian province, their desert white fungus has the following pro and con:

### Advantages:

1. Cost of electricity and desert land are low
2. Clean atmosphere hence no need for regular sanitization or anti-mold procedure
3. White fungus can be dried under sunlight after simple wash hence no pollution caused by fuel to heat drying kilns
4. Using local Hedysarum scoparium is as the main ingredient of germination base enables organic grade possible
5. Cost of local Hedysarum scoparium (source and transportation) are low
6. Cost of local production of germination base is low
7. Organic germination base can be used to enrich the sand from which organic agriculture and organic husbandry are possible

### Disadvantages:

1. Production of white fungus in Fujian is well established with systematic division of labour hence response to market change is highly effective
2. Existing bulk production brings good economic value
3. Fame has been well established
4. The cost element of depreciation of Intelligent Production Base cannot be avoided which may weaken response to poor market condition

Taking into the advantage of clean air they avoid potential pollution from antiseptic treatment. It is feasible that they can fulfill the requirement of Organic grade white fungus which will be well accepted by the high-end market. Furthermore, experiments indicate that they can use one of their widely grown plants the Hedysarum scoparium can be chipped as germination base for the white fungus. Apart from production of organic grade white fungus, the germination base can be used to enrich the sand and turn it into soil. Such soil will in turn support organic agriculture and organic husbandry. Hence a healthy and environmentally friendly cycle is established.

In addition, they are exploring other routes to sustainability:

- Extract polysaccharide for skin cosmetics
- Educational centre
- Cultural tourism
- Herbal medicine such as Cistanche deserticola Ma (肉蓯蓉) and Cynomorium songaricum Rupr (鎖陽)

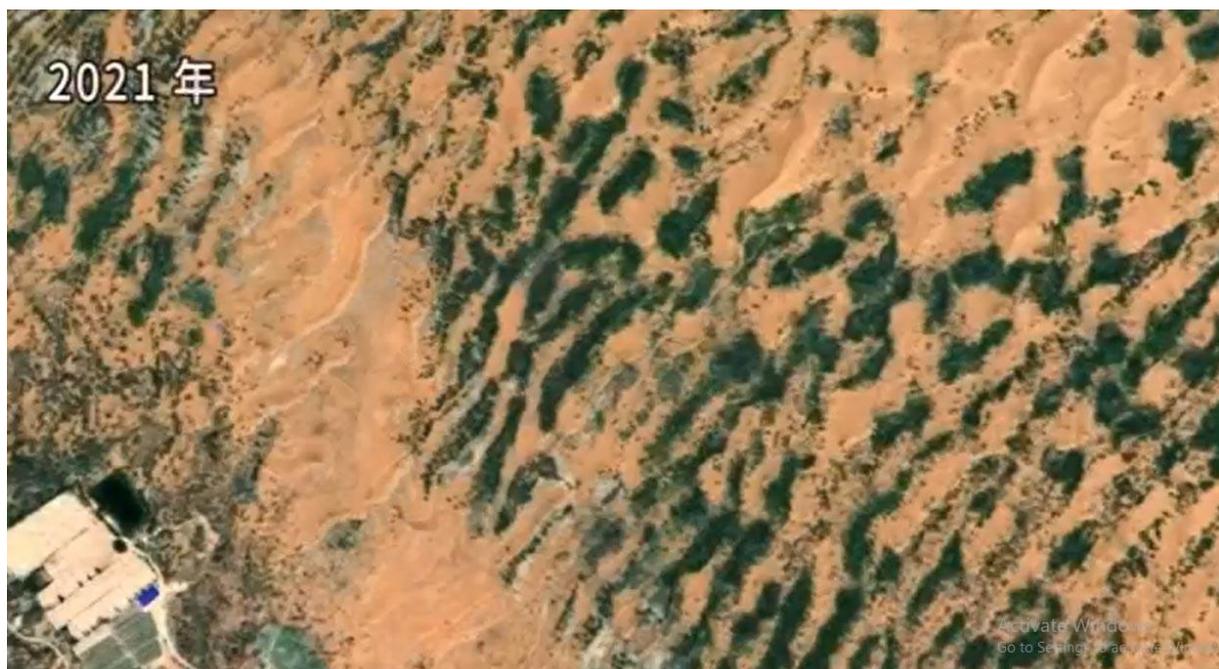
## Cost-Effective Sustainable Re-Vegetation of Deserts for ESG in NW China

After years of work in the desert, they find desert land is NOT dry and mundane as most Hong Kong people think. There are a lot of imagination and possibilities. Readers are welcome to visit to the desert site above-mentioned. You will be surprised with a brand new experience. As an interesting and fruitful by-product of this research, the Main Author has been invited to present his research findings at the United Nations Climate Change Conference **COP29** in Baku, Azerbaijan during 2024/11/11-22. The above valuable experience was shared to countries which have similar geographic desert terrain, in particular for those countries in the Middle-east and Africa. Consequently, the research findings were well-received and a network of experience sharing has been established for the cost-effective sustainable re-vegetation / afforestation of deserts for ESG is sparked-off in the Global South countries.

**App-1a:** Afforestation of Site Sample (Ariel view) from 2013 to 2016



**App-1b:** Afforestation of Site Sample (Ariel view) from 2019 to 2021



**App-2:** Afforestation of Site Sample View change from 2012 to 2020



**App-3:** Samples of Flora grown resulted from the Afforestation



**App-4:** Investment and Return of Afforestation from 2012 to 2020

**Afforestation**  
90 sq.km

**Investment**  
RMB-37m

**Farmers employed**  
76,000 counts

Farmers and herdsman have become partners in the sand control cause. Their income has increased, and at the same time, they have naturally received ecological protection education, thus resolving the contradiction between overgrazing and ecological protection.

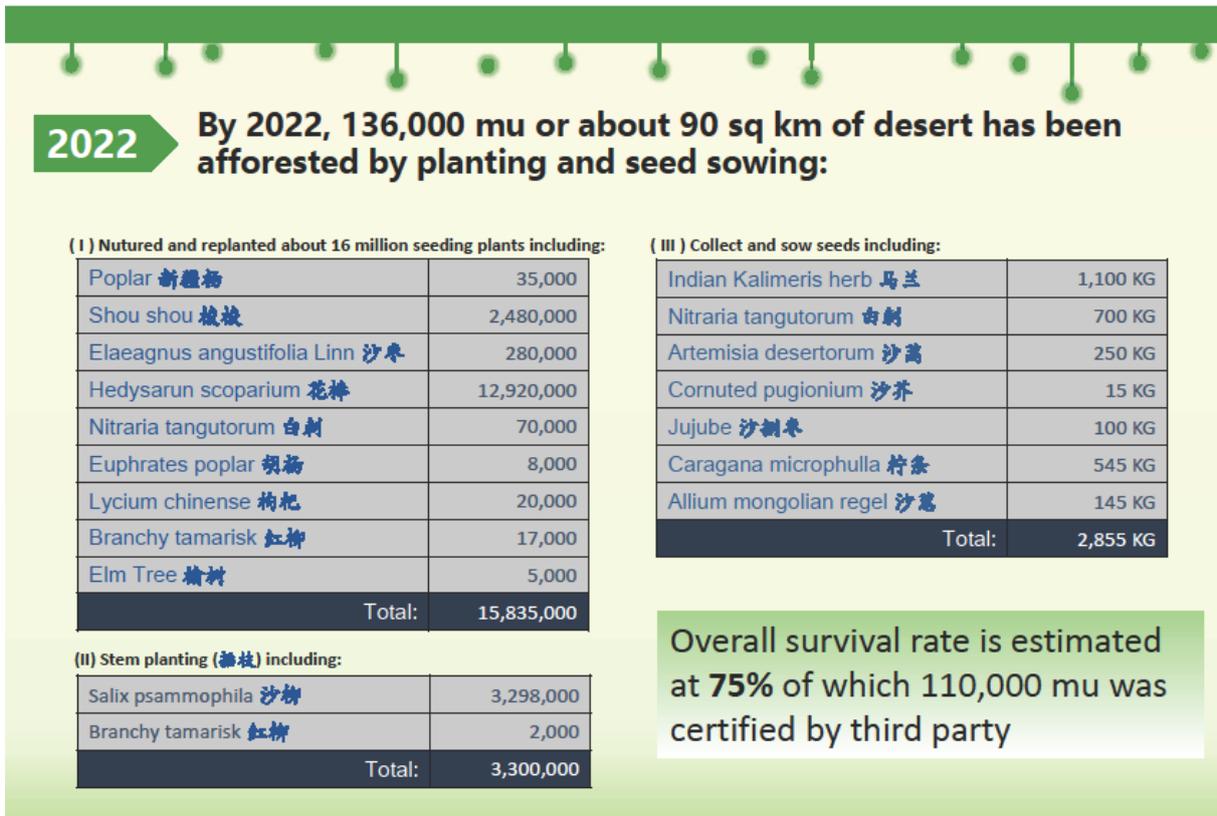


**App-5:** Afforestation of Site Sample View change from 2012 to 2020

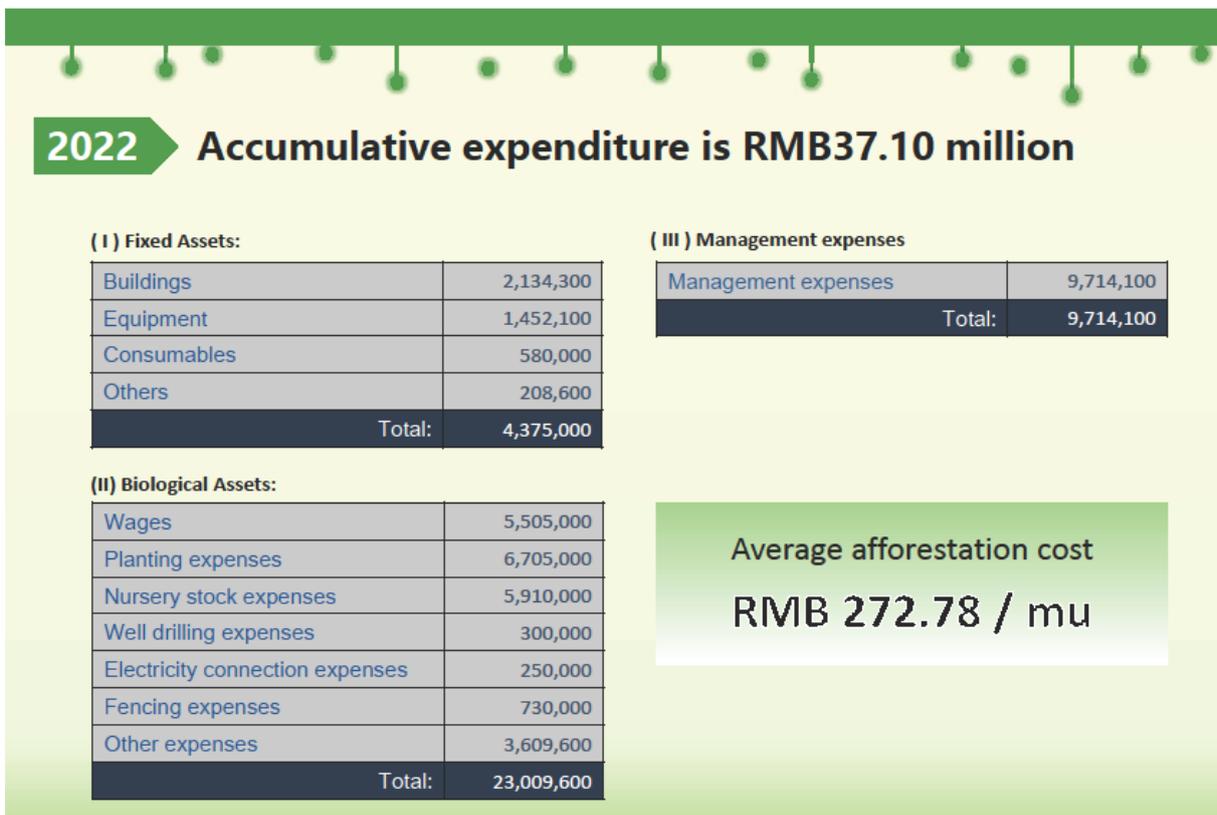
Planting water-saving, greening and pollution-free Tremella fuciformis, and using "culture medium" to improve desert soil



**App-6:** 90 sq.km of Desert has been afforested by Planting & Seed-sowing



**App-7:** By 2022, RMB-37mil. ( = RMB-182,000/sq.km ) has been spent



**App-8:** Photo of the interior of the White Fungus Experimental Production Base



**App-9:** Photo at the Malan Lake Afforestation on 2024-9-11 with the Main Author



## ABOUT THE AUTHORS

**Shu Wah YUEN** <sup>0009-0003-5412-8202</sup> -- graduated from HKU with a first class honour B.Sc in 1972 to be followed up with a MSc in the University of Wales in 1975. After graduation, he became an entrepreneur and founded Manfield Coatings Company Limited in 1986. He participated in philanthropic work via Gratia Foundation including several Children's Home in China and Bangladesh. He involved himself in ESG through reforestation of Malan Lake in Tengger Desert, and hence this paper is written. He is also the Founder of the Gratia Christian College. He is also the Dist. Keynote Speaker at the **24-ICIT**.

**Hong Sheung CHUI** <sup>0000-0001-5581-8879</sup> -- BSc, Dip. Ed., MA, PhD; President at the Gratia Christian College in the HKSAR. Prof. Chui is a seasoned academic and education administrator who has led his previous Hang Seng School of Commerce to the top matriculation school which swept around 40% of all the as in the same subjects A-level results amongst 400 schools in the HKSAR. He is also the Co-chair of the **24-ICIT** ( [www.hk5sa.com/icit](http://www.hk5sa.com/icit) ).

**Samuel K. M. HO** <sup>0000-0002-8102-1481</sup> -- BSc, MSc, PhD; Research Professor at the Gratia Christian College in the HKSAR. As an ex-Research Fellow in TQM at Cambridge U., and Guest Speaker in Lean Mgt. at Oxford U., he was also Visiting Professor in TQM at Coventry, Paisley, RMIT, Linnaeus, NUS, HKU, CUHK, PKU, THU & SYSU. During 2000-2005, he was the Chief Editor of the Journal of Service Management (Ranked Q1 with H-88 by **SJR**). As the Founder Chair of the Int. Conf. on ISO & TQM (**ICIT**), he is chairing the **24-ICIT** at GCC during 2025/2/6-8. [samho@gratia.edu.hk](mailto:samho@gratia.edu.hk) -- *Corresponding Author*

**Shirley M. C. YEUNG** <sup>0000-0002-5566-1573</sup> -- **MA, PGDE, DBA;**

Professor of Practice & Head of Business at the Gratia Christian College in the HKSAR. She is an IEMA approved Sustainability (CSR) Practitioner, Experienced ISO9001 Principal Auditor, AQIP Assessor, US. HKCAAVQ Subject Specialist and QMS lead auditor. Chair of Community Education, Int. Centre for Env. Education & Community Dev. (ICENECDEV); Ambassador, Institute for Economics & Peace (IEP). She is also the Keynote Speaker at the **24-ICIT**.

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There is NO funding involved for conducting this research.

## DECLARATION OF CONFLICTING INTEREST

The author declares NO conflict of interest. There are no other third parties in the design of the study, in the collection, analyses, or interpretation of data, in the writing of the manuscript, or in the decision to publish the results.

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✉ [editor@iaeme.com](mailto:editor@iaeme.com)