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(REVIEW ARTICLE)

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Desertification, environmental, climatic change and role of trees, shrubs and green areas

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Abstract

Background: Desertification exacerbated and raised by climate change and represents one of the greatest environmental challenges of our times. Also, Desertification and climate change are an old phenomenon has not been a threat to life people, in the past so as to provide the natural ecological balance back then, but because of the range of the factors, we will recall it.

The desertification and climate changes has started to worsen and its negative effects have increased at all levels, Economic, social and development. Trees, woody shrubs and ornamental plants represent an ever-important group in that they are the raw source for many important industries such as the manufacture of wood, food and medicine, health care (alternative medicine) and as windbreaks, and they play an important role in improving the environment, especially in light of the current climate changes.

Main body: During recent years, the interest in planting woody trees and ornamental plants has increased, and its role has remained confined to a narrow range. It's important and fundamental role as a primary locomotive in combating desertification, sand encroachment and sand dunes, resisting successive climate changes, improving the environment and protecting it from pollution, as well as its prominent role in addressing the big problems that result from The movement of sand dunes and their threat to industrial and residential facilities, roads, farms,.... etc.

Conclusion: The role of plants, trees, green areas are combating desertification and climate change, these trees does not depend on protecting farms only, but extending them to protecting urban communities and new cities from sand, which may lead to completely covering homes and establishments, but also to destroy the entire infrastructure (roads, tunnels, electricity, irrigation lines, railways ... It also plays a role in protecting the beaches and coastal areas from the high waves.

Keywords: Desertification; Climate change; Combating desertification; Shrubs; Trees; Green areas

1. Introduction

Desertification exacerbated and raised by climate change and represents one of the greatest environmental challenges of our times. Also, Desertification is an old phenomenon has not been a threat to life people, in the past so as to provide the natural ecological balance back then, but because of the range of the factors, we will recall it.

The desertification and climate changes has started to worsen and its negative effects have increased at all levels, Economic, social and development. The reason for this is mainly due to increased intensity population growth, increased

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demand for food, urban expansion at the expense of land to other agricultural, expansion and uncoordinated intensification of land investment, aspects of pressure on desertification.Therefore, there are many attempts to reduce the harmful effects of climate change and desertification. Including the use of trees, shrubs and green areas, which play an important role and clear effective in this direction and we will explain that later.

It is defined by the [1] as land degradation in arid, semi-arid and sub-humid areas resulting from various factors including climatic variation and human activity.

In general refers to the process of fertile land transforming into desert typically as a result of dissertation, drought or improper/inappropriate agriculture.

Today's arid and semi-arid lands concerned about the phenomenon of desertification.

Projects and programmers have been formulated in both national and international level to combating climate change and desertification.

At the same time role of a forestation become more important in order to restore land degradation, support agriculture, strengthen food security and safeguard water reserves [2]

Land degradation is one of the important drivers of many social, ecological and economic complications, especially in developing countries many local conflicts exist around current land use, even if it is not being degraded as shown in Romania and Switzerland [3]. Therefore, the estimate of policies to reduce land degradation become key feature of achieving such complications of food insecurity, poverty and loss values of ecosystem service [4][5][6]. Land degradation results from different parameters including climate change and human activity in arid and semi arid and dry sub-humid regions[7]. It is a severe environmental problem confronting the world today. It has damagingly impacts on agricultural productivity and on environmental function that eventually affects human living and quality of life [8].

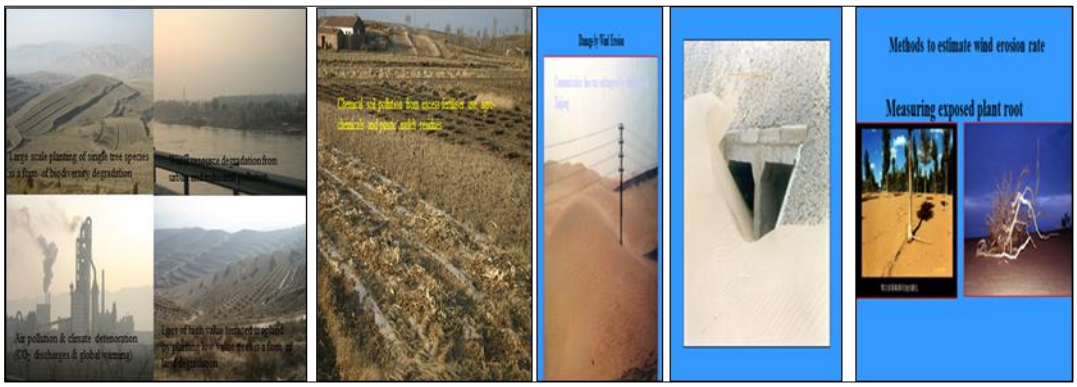

Figure 1 Some manifestations and damages caused by desertification and climatic changes

2. Means to reduce desertification

Install of sand dunes, Preserve natural grazing and developing natural vegetation cover, Control irrigated crops and review the current means of irrigation and drainage, Dry agriculture, where planting the plants which needs require little water and highly resistant to drought, Preserve vegetation and avoid overgrazing and Surround the fields and lands which vulnerable to erosion of trees and shrubs

3. The Climate change

Climate change and land degradation are highly interlinked. Therefore, climate change can lead to desertification and abandonment of lands and forms. So, climate change and desertification are two challenges cannot be managed separately. Where the steps which taken to reduce land degradation and rehabilitate degraded areas contribute to climate change mitigation and adaptation.

Climate change and desertification should be seen as platform for decision markers to formulate new policies. Indeed, these environmental challenges are complex with plural facets and influenced by the combination of natural and human factors [9].

Climate change and its effects on desertification are large scale issues which require global scale measures. Recently, [10] indicated that, the climate effects on land occur at ecosystem and landscape levels. Therefore, we need more individual and global community efforts to rehabilitate lands and landscapes to combating climate changes.

Climate change occurs due to nature factors hangs in the earth's orbit around the sun and the resulting change in the amount of solar radiation reaching earth. This is a very important factor in climate change and occurs throughout history. Any change in radiation affecting the climate changes, volcanic eruption and change in atmospheric components. The second reason occurs climate change is logging and deforestation, human use of unclean energy, human use of fossil fuels.

Climate change–warming of air temperature helps to accelerate evaporation and pollution salts in cultivated land and can cause drought conditions and prevent the sustained growth of vegetation, with this processes around 12 million hectares from productive land become barren every year due to desertification and drought alone [10].

Landscape and trees, urban trees and shrubs can reduce these problems by planting and caring for it. Certainly trees are good for our environment. But can urban trees make a difference in climate change. We can either reduce CO_2 emission or we can re-absorb CO_2 from the air.

Climate changes will affect human well-being in many parts of the world [11]. Ecosystems services are benefits people obtain from ecosystems and can classified as provisioning services (e.g., timber and firewood), regulating services (e.g., water regulation and cultural services (e.g. recreation)[12]. Examples of ecosystem based on adaptation, the restoration of mangrove shelterbelts for the protection of coastal settlements against storms and waves and the conservation of forested for reduction of flood risk [13].

4. An environmental and economic Benefit of Trees, Shrubs and Forests

The forest benefits are divided into three categories Social, economic and ecologic

4.1. Social Benefits

Numerous studied have been done about the social and psychological benefits in environments. The urban public housing residents who lived in buildings without trees and grass nearby more severe than residents with green nearby. A similar study found that with trees and green areas also provides humans like (a space for people to play, walk, jog, and bird watch. These activities are good for physical and mental health, providing a place to unwind and trees also reduce noise levels. Native plants community provide a balance in global biological diversity, healthy environment, help preserve the ecological balance, organisms that depend upon them for their survival, food and shelter to numerous insects, birds and animals [14].

4.2. Economic Benefits

In a study that considered the costs and benefits of municipal forests in five cities, the researchers found that, every dollar spent on trees, the benefits returned were worth from 1.37$ to 3.09$. A little math tells us this is clearly a good investment. Trees save money through reduced energy costs. Which created from a heat of island concrete, asphalt, building and other surfaces absorbs and hold heat from the sun? In summer, cities can exceed from 5-10c^o warmer than surrounding areas.

The trees placed in the proper location can reduce total heating and cooling their homes costs by 8%.Also cut woods, made furniture, lumber for park, shelters to artwork. Products range from specialty furniture, to musical instruments considered other economic benefits.

In Several case studies, the role of forest products is not limited to local consumption for food security, but includes commercial activities. Increasing market access with positive outcomes for livelihood and social resilience [15].

Trees can be beneficial for cash crops such as coffee and cacao as well. Coffee is sensitive to microclimate fluctuations; the optimal temperature range for Arabic coffee is 18-21 C^o[16]. In study in Indonesia Showed that, Cacao shaded by

Gliricidia trees are not significantly affected by drought because of shade and water uptake from the trees[17][18]. Increasing shrubs cover led to increases in foliage concentrations of fibber and lignin [19].

In many coastal areas of south and south East Asia, mangrove forest conversion or exclusion from access has increased the vulnerability of poor coastal communities. When mangroves are restored and accessible, people have access to diversified products (fish, fire wood, timber, construction material, fodder, medicinal plants and honey) and are more resilient to climate hazards, as was shown in Vietnam[20][21] Bangladesh [22]and the Philippines [23].

4.3. Ecological Benefits

Aquatic plants such as floating *Eichhorniacrossipes, Lemna minor and Pisitiasp*have been investigated for use in rhizofiltration [24]. Trees and plants considered or have been labeled as the lungs of cities, because they have the ability to remove contaminants from the air. Acting as natural filters and reducing air pollution, generate health benefits by reducing the mortality rate and reducing visits to the hospital [25].

Six species of plants such as *Rhododerdron hybrids, ficus elastic, Cadiaeum variegatum, Hemerocallis fulua, Euphorbia pulcherrima and Cymbidium sinense* were chosen to test removal capacities at gradient concentrations of benzene and toluene [26]. Also, *Dracaena deremensis* was found to be the species with largest capacity to remove benzene from indoor air [27].

Plants are also used to remove or reduction contaminations from the soil (phytoremediation) [28]. In these respect [29] reported that, *Calendula officinalis, Althaea rosea and Impetiensbalsamina*had higher tolerance to Cd and Pb contamination and could effectively accumulate the metals.

Trees not only does reducing energy consumption save money, it has ecological benefits as well, with reduced energy consumption comes reduced pollution, which improve air quality and forests provides four main air quality benefits.

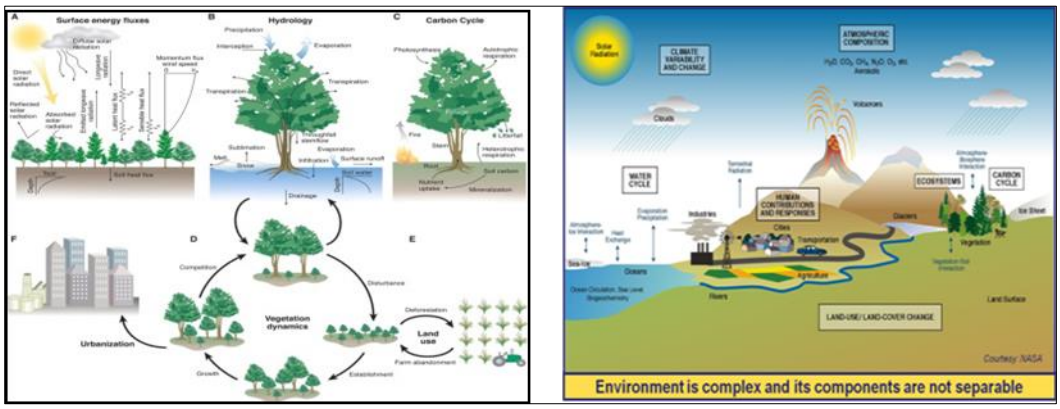

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Figure 2 Roles of trees in absorb gaseous pollutants (ozone, nitrogen oxides sulfur dioxide), Trees intercept matter (dust, ash pollen and smoke), capture CO2 and release O2 through photosynthesis, transpire water and shade surfaces which lower air temperature, thereby reducing ozone levels, reduce soil erosion leaves and branches surfaces intercept and store rainfall, reduce raindrops as bare soil, and Transpiration of trees reduces soil moisture and increasing the soils capacity to store rainfall.

Overall, scientific evidences suggests that woody encroachment enhances important ecosystem services by maintain healthy soils, mitigating dry land salinity, capturing water, removing atmospheric pollutants, sequestering CO_2 and providing habitat for other species [30].

Bamboo is fast-growing so it provides a rapidly renewable source of fuelwood and timber. While hardwood trees can take 30 years to mature and must be replanted past harvest, giant bamboo matures in only a handful of years and can be harvested; every year for its entire lifecycle is around 80 years. Woody bamboos an also sequester carbon, helping to curb climate change, prevent some diseases like malaria [31].

Each tree transpires or recycles over 200 gallons of rainwater each year, by the time trees reach 20 years old; they have an a canopy which transpires 20,000 gallon of water per acre per year. Tropical trees prevent erosion especially when

planted in watersheds along the rivers. Trees roots hold the banks of rivers, growing in and mong the rocks. Trees shade the river water and lower the water temperature.

More than 50% of a tropical tree's woody biomass is sequestered carbon, which is why tropical trees are so important in the fight against global warming and climate change.

5. Fighting climate change and desertification with trees, shrubs and landscapes

All countries about the phenomenon of desertification, policies, strategies at both world and country level. At the same time, the role of trees, shrubs, forests and landscapes in land use should important in order to restore degraded land, support agriculture, strengthen food security, safeguard water reserves and enhance the well-being of local people.

5.1. Trees and the climate change

Forest species guard against desertification and climate change through the provision of multiple ecosystem services including soil erosion control. Trees and shrubs not only provide these ecosystem services but also provide firewood, structural timber traditional medicines, staple foods and drought emergency foods Patrick [32].A greater number of annual plant species have been introduced and cultivated in degraded lands in arid and semi-arid areas when compared to the early days when anti-desertification projects started in Iran 1950 [33].

Just trees properly placed around a house, can save up to 30% of energy use. Trees and shrubs planted to shade air conditioners help cool a building more efficiently, using less electricity. A unit operating in the shade uses as much as 10% less electricity than the same one operating the sun. Trees absorb CO_2, the primary gas causing global climate change. One acre of forestland will sequester between 150-200 tons of co_2 in its first 40 years. In comparison to preventing the loss of natural forests, however, tree planting has the potential to make only a limited contribution to reducing CO_2 levels in the atmosphere. The flora diversification system has reduced pest and disease plagues and improved biodiversity and adaptability to climate change in comparison with monoculture systems [34].

Dry lands estimated to cover as much as 41% of the earth's land surface [35].The climate conditions in such environments are harsh, and trees, shrubs growing there are characterized by a complicated tree structure with multiple-stems and large variations in the dimensions adapted to such an environment [36].

Growing the right tree in the right place on farms has potential to slow climate change, feed more people,protect the environment and tree organic nitrogen.

The degree of effectiveness of trees in sustaining agricultural production and microclimate in agricultural production and make crop production more resilient to climate variability [37]. Agro-forestry (Combining trees and shrubs with crops and/or livestock) increasingly recognized as an effective approach for minimizing production risks under climate variability and change [38].The contribute water flows during dry and rainfall events that help to adaptation to climate change and reducing the negative impacts of climate hazards on infrastructure settlements, and water users [39].

5.2. Trees and Desertification

Many different restoration efforts have been implemented in order to reserve deforestation and land degradation among these efforts are the establishment of enclosures, where degraded land areas protected from tilling, cutting of trees and grading by livestock, mainly through soil fencing, to allow for natural regeneration of plants, shrubs and trees, and subsequent ecological rehabilitation [40].A literature search for tree and shrubs biomass models developed particularly for dry lands, revealed relatively few studies, aboveground biomass (AGB) models existed for only six trees species, i.e two exotic species and four species from natural forests.In 2005, a total of 37 cultivated plant species were identified in anti-desertification projects as compared to 25 species in 2000 and a handful in the past [41].

In order to improve food security, arid region should establish desert agriculture and desert agro-forestry as their mainstream agriculture technique; such regions include Africa, the Middle East and Australia. Also, growing plants and crops in desert areas will help to prevent desertification. Encroachment of woody shrubs into grasslands has been commonly observed in the arid and semi-arid regions and often reported [42][43].

Current research shows that Eucalyptus trees, commonly known as water guzzler use up a lot of water when planted near water beds and able to grow in the edges of sahra desert, eucalyptus trees grow quickly,so they are a good source of wood for foresters, [44]. Eucalyptus trees able to grow on the edges of sahara desert and can be helpful with controlling desertification.

[45] reported that, the greet green wall (GGW) has been advocated as a means of reducing desertification and climate change in the Sahel through the planting of abroad continue band of trees, they used (*Leptospermum scoparium, Basicasenegalensis, Grewiaflava, Eucleaundulata and Diospyroslycioids*.

In Nigeria the major strategy used to control desertification were used in planting shelterbelts (*Azadirachtaindica, Eucalyptus, neem, Cassia spp*). Shelterbelts are long were aligned to break the impact of prevailing winds to break the most damaging of winds and for main objectives to provide fuel wood, source of poles for buildings, stabilizing soils and reducing winds, increase crop productivity and make marginal land more arable [2].

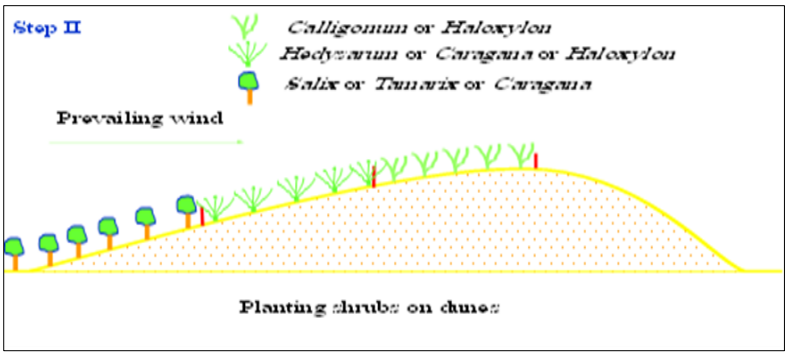

Figure 3 Some famous plants for sand dunes fixation

Figure 4 Some famous plants for sand dunes fixation

Using native plants adapted to desert conditions, faster on region areas and consume less water are important to face hazard of climate change and desertification [46]. In the arid and semi-arid regions various species of trees, shrubs and grass can be used for dune fixation like *Atriplex spp and Acaia spp* [47]. In El-Shaikh Zuweid,[48] used (Moghal, Liquorice, sisal and opuntia) as a biological fixation of coastal sand dunes [49] cultivated *Casuarina eqsetifolia* forthe control of the coastal and sand dunes of Senegal. The most popular cultivated plants tolerated for stress condition under sand dunes in Egypt are *Acasia saligna, Prosopis palled and Atriplex nummilaria* [48].

6. Identification of plants according to desert types, climatic and terrestrial standards (Soil and climate change factors)

Table 1 Suitable Plant Species for Different Desert Types (Heshmati,2011)

		Suitable Species
1	Desert	*Populuseuphratica, Populus alba* var. *pyramidalis, Populusgansuensis, Reaumuriasoongorica, Elaeagnusangustifolia, Caraganakorshinskii,*

		*Hedysarumscoparium, Haloxylonammondendron, Calligonum*sp, *Tamarix*spp. *Artemisia arenaria, Zygophyllumxanthoxylum*and *Atraphaxisbracteata.*
2	Sand dunes	*Haloxylonammodendron*Bge., *Tamarixramosissima*Ledeb., *Hedysarumscoparium*Fisch.et Mey., *CaraganakorshinskiiKom, Calligonumarborescens*Litv., *C. caput medusa* Schrenk and *C. mongolicum*Turcz.
3	Arid area	*Haloxylonammodendron, HedysarumscopariumCaraganakorshinskii.*
4	Semi arid area	*Salix matsudana, Populuscanadensis, P. simonii, P. nigra* var. *italica, P. alba* var. *pyramidalis* and *P. nigra* var. *thevestina.*

Table 2 Suitable Plant Species for climate factor

		Suitable Species
1	High temperature tolerant plants	*Tamarixspp, Acacia spp, Delonixregina, Cupressusspp, Aadirachiaindica, Populusspp, Washingtuniafilifera, Melia azedarach, Bohainvelliaspp, Neriumoleandi, dodoneaviscosa, Agave spp, Lantana camara*
2	Low temperature tolerant plants	*Tamarixspp, Araucaria spp, pinusspp, Cupressusspp, Eucalyptus spp, Thujaorientalis, Quercusrubra, Acacia farnesina, Acacia tortilis, Rose spp, Schinusmolle*
3	Plants resistant to smoke and dust	*Tamarixspp, Ficusspp, Melia azedarach, Hibiscus spp, Draceanaaustrails, Eucalyptus spp, Ailanthus altissima, Populsspp, Neriumoleande*
4	Plants resistant to drought and thirst	*Tamarixspp, Casurainaspp, Thevetiaspp, Ricinuscommunis, Cupressusspp, Albizialebbek, Ziziphusspp, Elaegnusangustifolus, Conocarpus erectus, Yucca spp, Lantana camara*
5	Plants that withstand weather and wind flections	*Tamarixspp,*Araucariaspp,Acaciaspp,*Nerium oleander, Cupressusspp,Calatropisproera, Casurainaspp,Ziziphusspp,Azadirachtaindica,|Prosopisspp,EucalyptussppPunicaspp*
6	Plants resistant to seawater and salinity near the coast of the seas	*Tamarixspp, Tecomaspp, Jacaranda spp, Myopourmserratum, Salicornia begolovi, Mangarovespp, ficusspp, Brachychitonpopulneus, Rhizophoranucronata, Dodoneaspp, Washingtoniafilifera, Eucalyptus spp, Acacia spp*

Table 3 Suitable Plant Species for soil and soil factors

		Suitable Species
1	Plants suitable for cultivation in light sandy land	Tamarixspp, Myrtuscommunis, Dalbergiasisso, Cestrum elegang, Quince spp, Acaiafarneiana, Plumbagoauriculata, Thevetiassp, Tecomaspp, Bogniaspp, Lantana spp, Jasminumspp, Grevillea robusta, Schinusmolle
2	Plants suitable for cultivation in heavy land	Tipuanatipu, Delonixregia, Adhatodaspp, Bombaxspp, Araucaria spp, Bauhinia spp, Begonia spp, Ipomea palmate, Morusspp, Thujaorientalis, Euphorbia pulcherrima, Cocos spp, Durantarepens, Washigtuniafilifera, Cupressusspp, Acacia arabica, Melaleuca spp, Hibisusspp, Rose spp, Moringaspp, Ficusspp, Plumeriaspp
3	Plants bearing the Alkaline soil	Tamarixspp, Melia azedarach, Parkinsoniaspp, Acacia spp, Bauhinispp, Jasminumspp, Casuarina spp, ficusspp, Nerium oleander, Melleucaspp, Callistemon viminalis,Albizzialebbek,Populsspp
4	Plants bearing the calcareous soil	Callistemon viminalis, Albizzialebbek,Opuntiaficus-indica,Oleaspp
5	Plants bearing salt soil	Tamarixspp, Tamarixamplexiaulis, Parkinsoniaspp, Calatropisprocera, Prosopisspp, Ricinuscammunis, Ficusspp, Mangarovespp, Casuarina

		spp, Dalbergiasisso, Eualyptusspp, Myoporumserratum, Conocarpus erectus, Salicornia begolovii, Avicennia marina, Rhizophoramucronata
6	Plants suitable for cultivation in shallow lands	Albizzialebbek, Acaiafarnesiana, Cupressusspp, Populus alba, Eucalyptus spp, Schinusterebithifolius, Ficuscarica
7	Plants suitable for cultivation in gravel land	Parkinsoniaspp,Pinusspp,Ceratoniasilique,Tamarixspp,Cupressusspp, Casuarinaspp,Populsspp,Morusrubra

7. The practical application of use Trees, Shrubs to combatingdesertification and climate change

7.1. Establishing shelterbelts for farmland

The relation between sheltered effect and wind speed is more complex. It relates to forest structure, tree species, density of penetrating sunshine spaces, temperature conditions at closing ground, the angle between wind direction and forest belts, etc.

Shelterbelts for farmland have a lot of benefits, such as, dynamic, thermal-dynamic, hydrologic, soil improvement, biological, environment, and economic and improve the farming eco-environmental conditions.... etc. Generally, many benefits of shelterbelts for farmland are a combination of all above and are mainly reflected in ecological, economic and social benefits. Some conditions are briefly introduced in the following paragraph. Forest belts influence the microclimate in many ways in a certain area; however, the sheltered wind effect is one of the most important functions disorderly air flows, thermal energy and mechanical energy by branches and leaves swayed, etc. Finally, the wind speed is declined. The scale of reducing wind speed is 20-25 times as long as the forest belts height; generally, the average wind speed can be reduced 25-35% in this scale. This is basic physical principle of windbreak function of forest belts. Its sheltered effects are following [50][47].

Table 4 The relationship between wind speed and sheltered effect

Wind speed (m/s)	Sheltered effect (%)			
	5H	10H	15H	20H
5-7	39.7	14.5	5.8	1.1
7-9	42.2	15.9	7.9	3.2
>9	48.3	23.6	17.7	10.4

8. Some successful models which have been employed are shelter forest system

8.1. Model of biosphere

According to [51] reported that, this small biosphere model basically consists of three small circular zones. The ‘core zone’ is arranged in the center part, occupying about (1 to 4 ha) cultivated with productive crops such as wheat, maize, rice and fodder crops. It is used for food and fodder production. The out-fringe of the core zone is a ‘protective zone’, covering about (10 to 20 ha) of sandy land or sand dunes, where shelterbelts and windbreaks are planted. The houses and the animal yard are also arranged in the protective zone. Outside of it is a circular shaped ‘buffer zone’, occupying about 100 to 200 ha of sandy land or dunes. This buffer zone is used for light grazing, allowing 0.2 to 0.3 sheep units in one ha, or even forbidding grazing in the beginning of the small biosphere construction for vegetation establishment and to reduce the movement of sand. With the increase in crop and fodder production in the core zone the stocking rate on the surrounding sandy rangeland can be decreased gradually. This model can both reduce poverty and protect vegetation. Each small biosphere is managed by one family, which consists of 4 to 6 people. This way the income of the family has increased from less than 5,000 RMB yuan to more than 40,000 yuan in 5 years; the rangeland resource has been restored and the environment improved.

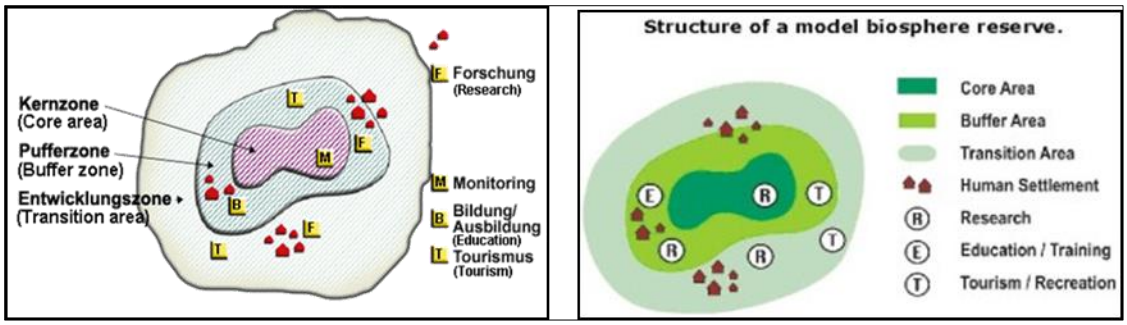

Figure 5 Structure of a Model Biosphere Reserve

8.2. Models of practical application work for protection infrastructure

The land uses that are suffering most from desertification are agricultural areas, highways, railways, roads, cities, industrial places and mining areas. The important plant species used for combating desertification and moving of sand dunes are *Hedysarumlaeve, H. scoparium*, *Amorphafruticosa*, *Lespedeza bicolor*, *Caragaramicrophylla*, *C. korshinskii, Artemisia halodendron*, *A. sphaerocephala*, *Astragalusadsurgens*, *Ulmuspumila*, *Hippophaerhamnoides, Haloxylonammodendron*, *Calligonummongolicum.* Different models have been applied for protecting agricultural areas, cities, highways, railways and roads, industrial or mining and reservoir properties.

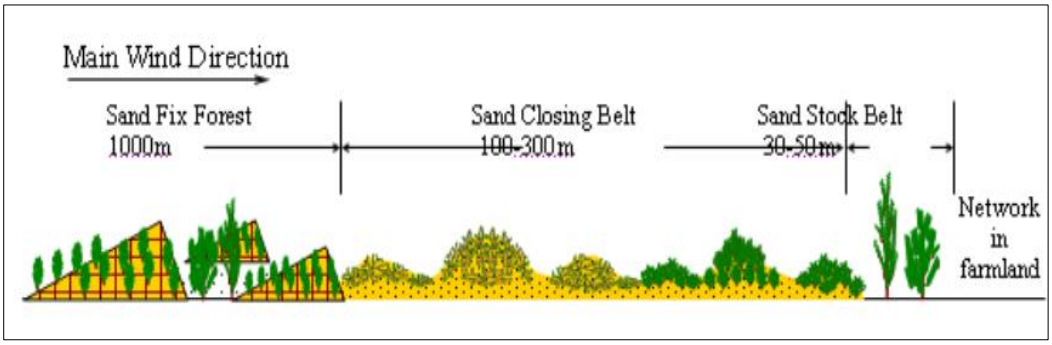

Figure 6 Shelter System Structure of Sand- breaking Forest Belt

[52] reported that there are Some successful models which have been employed are shelter forest system in oases, shelter system for sand fixation in agricultural areas, transportation, industrial or mining and reservoir properties. Also,[53] revealed that, there are generally three major types of severely decertified land. Through several years of experiments and demonstration services. So, we have developed an eco-model named 'small biosphere', which can promote the above mentioned theoretic approach to be realized in the hyper arid regions, it is the most important measure for protecting railways and highways from moving sand; for example,the Lanzhou xinjiang railway [54].The technique has successfully protected 500km of highway crossing the Taklamakan Desert as mentioned by [55] and has been found to be useful for dune fixation.

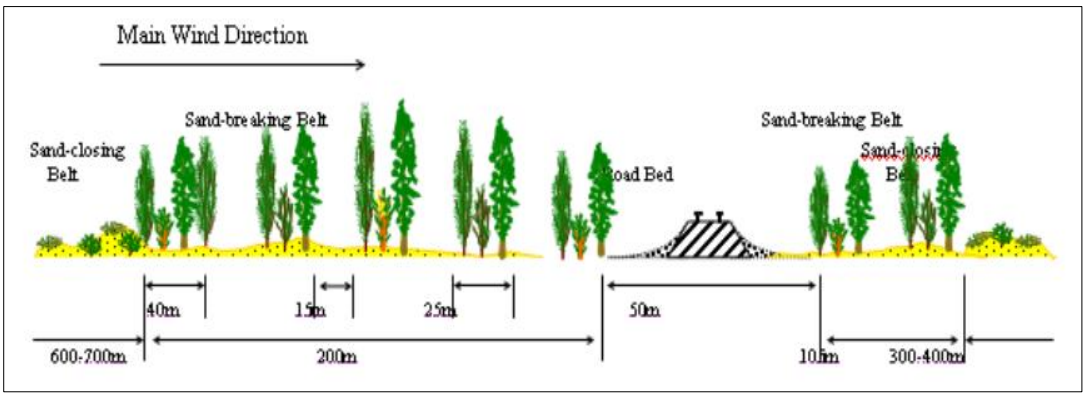

Figure 7 Structure of Shelter Belts in Railway Line

8.3. Role of Trees and Shrubs in Slope stability

A great deal has been written on the relationship between the landslides and several species of grass, shrubs and trees which have been used to control the erosion and to stabilize landslide scars for hundreds of year.[56] had reported the work of engineer Pan in 1591, who employed willow planting to stabilize embankments during the Ming dynasty of china. A list of practitioners over the years pioneered slope revegetation techniques to emulate the work of nature. Deforestation, therefore, is considered to be a main cause of the landslides [57].In India many workers underline the role of vegetation in slope stability. Trees such as *Acacia catehue, Boehemeria rugulosa, Aesculus indica, Erythrina suberosa, Dalber giasisso, Wendlandia puberula, Salix tetrasperma and Bombax ceiba* have been pointed out to have far reaching effects on the stability of the slopes [58].However, a few studies have found a destabilizing effect of vegetation on slope stability [59].

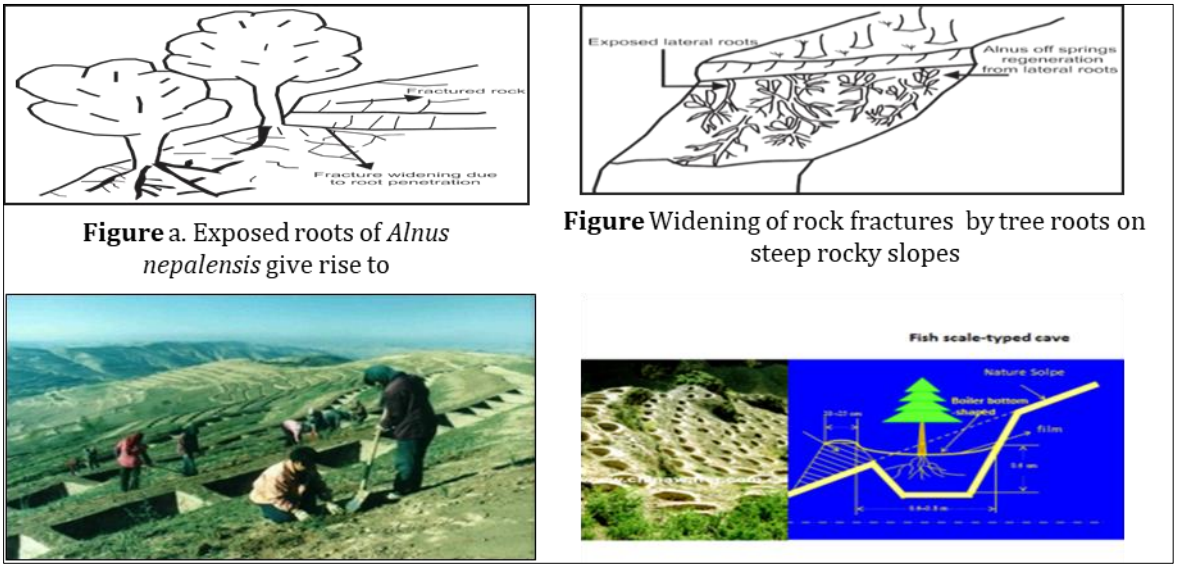

Figure a. Exposed roots of *Alnus nepalensis* give rise to

Figure Widening of rock fractures by tree roots on steep rocky slopes

Figure 8 Plantings rocky slopes

8.4. Simulated shrub, Trees

According with the practical situation, we must find a new way to construct a new preventing and combating sand system in arid region, this method use little water, or no water, not compete water with farmland, so this sand controlling system is the need for ecological environment construction. Under the different wind speeds, different quantity of branches of simulated shrubs showed different effects of preventing wind, so if we understand the wind velocity changed law of simulated shrub in near surface ground can help us to further recognize the wind-preventing functions.

Figure 9 Planting simulated shrubs and trees

9. Conclusion

The role of plants, trees, green areas are combating desertification and climate change, these trees does not depend on protecting farms only, but extending them to protecting urban communities and new cities from sand, which may lead to completely covering homes and establishments, but also to destroy the entire infrastructure (roads, tunnels, electricity, irrigation lines, railways ... It also plays a role in protecting the beaches and coastal areas from the high waves.

Compliance with ethical standards

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The authors declare that they have no competing interests.

Statement of ethical approval

The manuscript does not contain studies involving human participants, human or animal data, and animal or human tissue.

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