Review Article
Derleme Makale
DOI: 10.24011/barofd.731741

Bartın Orman Fakültesi Dergisi,
22 (2): 642-653,
15 Ağustos/August, 2020

Journal of Bartin Faculty of Forestry
p-ISSN :1302-0943
e-ISSN :1308-5875

Desertification in the OIC Member Countries: Factors, Challenges and the Way Forward

Md Moynul AHSAN[1*]

Ankara University, Faculty of Applied Sciences, Department of Real Estate Development and Management, 06500, Ankara-TURKEY

Abstract

The Organisation of Islamic Cooperation (OIC) comprises of 57 member countries that are located in different parts of the world and many of them are situated in hyper-arid, arid and semi-arid areas. Based on secondary based research, this study highlights the factors that lead to desertification in OIC member countries and the challenges that need to overcome. The study found that the changing land use pattern and climate-related process were the direct causes of desertification in these countries. Decreased arable land, increased aridity and drought, population growth, urbanisation, encroachment on rangelands and forests, increased land degradation, and climate change are the key factors leading to desertification. Again, around 30% of OIC populations are living in Sub Saharan African countries, who still depend on subsistence agriculture. The old-fashioned forest management system also enhances the risk of losing forest resources. The study found that local phenomena especially unsustainable use of natural resources by local people and globalization phenomena in international food markets, neoliberalisation impact and thereby depletion of agriculture and forest resources, are laying significant role of deforestation and the resultant desertification in the affected OIC member countries. The study proposes that there is a need to establish a desertification monitoring and implementing center so that the OIC can take appropriate and coordinated actions in a timely manner. This center could help to raise awareness-building, regional campaign and management of natural resources in the issues of desertification across the OIC member countries.

Keywords: Desertification, Aridity, OIC member countries, Land degradation.

İİT Üyesi Ülkelerde Çölleşme: Faktörler, Zorluklar ve İlerleme Yolu

Öz

İslam İşbirliği Teşkilatı (İİT), dünyanın farklı bölgelerinde yer alan 57 üyeden oluşmaktadır ve bunların çoğu aşırı kurak, kurak ve yarı kurak olan bölgelerde bulunmaktadır. İkincil temel araştırmalara dayanarak bu çalışma, İİT üyesi ülkelerde çölleşmeye yol açan faktörleri ve üstesinden gelmek için gereken zorluklar vurgulamaktadır. Değişen arazi kullanım modelinin ve iklim ile ilgili sürecin bu ülkelerde çölleşmenin doğrudan nedenleri olduğu tespit edilmiştir. Ekilebilir arazinin azalması, kuraklık artması, nüfus artışı, kentseleşme, meralar ve ormanlara yapılan istilalar, artan arazi bozulması, iklim değişikliği etkisi de çölleşmeye yol açan kilit faktörlerdir. Yine, İİT nufüslarının yaklaşık %30'u Sahra altı Afrika ülkelerinde yaşamakta olup, hala geçimleri tarıma bağlıdır. Eski tarzda yapılmakta olan orman yönetim sistemi orman kaynaklarının azaltması riskini da artmaktadır. Yine, yerel olgular; özellikle yerel halk tarafından doğal kaynakların sürdürülemez şekilde kullanımı ve uluslararası gıda pazarlarında küreselleşme olgusu, neo-liberalleştirme etkisi ve böylece tarım ve orman kaynaklarının tüketilmesi, hepsi İİT üyesi ülkelerde ormansızlaşma ve sonuçta çölleşmenin önemli rolu bulunmaktadır. Bu çalışmada, İİT'nin uygun ve koordineli eylemleri zamanında alabilmesi için bir çölleşme izleme ve uygulama merkezi kurmaya ihtiyacı olduğu önerilmektedir. Bu merkez; İİT üyesi ülkelerin çölleşme konusunda bilinçlendirilmesini sağlayarak bölgesel kampanyalarını ve doğal kaynak yönetimini artırmaya yardımcı olabilecektir.

Anahtar Kelimeler: Çölleşme, Kuraklık, İİT Üyesi Ülkeler, Arazi bozulması.

***Corresponding Author (Sorumlu Yazar):**
Md Moynul AHSAN (Dr.); Ankara University, Department of Real Estate Development and Management, Tandogan Campus Ord. Prof. Dr. Sevket Aziz Kansu Building B Block Floor: 2, 06500, Besevler / Ankara-TURKEY. Tel: +90 (312) 600 0160, Fax: +90 (312) 600 0161, E-mail: **moynulurp01@gmail.com**,
ORCID: 0000-0003-0822-3850

Received (Geliş) : 04.05.2020
Accepted (Kabul) : 15.08.2020
Published (Basım) : 15.08.2020

1. Introduction

Simply, desertification refers to the persistent degradation of dryland ecosystems (Becerril-Piña and Mastachi-Loza 2020). In desertification, land is turned into desert-like conditions such as no or poor vegetation cover, where the rainfall is rare, very cold at night and very hot during the day. However, the definition given by the United Nations Convention to Combat Desertification (UNCCD) is more comprehensive i.e. "Land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors including climatic variations and human activities" (UNCCD 2014). Here, land denotes soil, and land surface vegetation and local water resources and degradation denote reduction of existing and/or the potential productive capacity of the land. Deforestation, on the other hand, means the act or result of cutting down or burning trees in an area. Forests heal drylands, prevent land degradation by stabilizing soils, reducing erosion, maintaining water and ecological cycling in soils, reduce the risk from salinization etc. Loses of forests and the resultant desertification ultimately losses biodiversity, enhances climate change by reducing carbon sequestration. Therefore, the United Nations have given emphasis on desertification and land degradation issues, and mentioned in target 15.3 of its Sustainable Development Goal no 15 and stated as "by 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world" as well as highlighting cross-connected issues such as improving living conditions of affected populations; enhancing ecosystems services etc. (UNCCD 2018). The Conference on Parties 12 also recognized that parties may use the UNCCD to guide their policies relating to Desertification, Land Degradation and Drought (DLDD) and voluntary targets when striving to achieve Land Degradation Neutrality (LDN) at the national and sub-national levels by 2030 where adoption of "Neutrality" focuses on special target (Ginzky et al, 2017).

It is important to note that desertification is not only caused by a single phenomenon but also a combination of factors that changes over time and varies by location (Becerril-Piña and Mastachi-Loza 2020, UNCCD 2017). It can collapse civilization that the world had observed from early civilizations such as from Carthage (presently located in Tunisia), to the Harappan civilization (currently belongs to Pakistan), to the Ancient Greece, to the Roman Empire, to the Ancient China, etc. The Islamic countries are located in various parts of the world that contains different climatic class including hyper-arid, semi-arid, dry sub-humid, humid, very humid areas.

The OIC population share to the world population is projected to reach 25.3% in 2025 and 29.8% in 2050 but the share of non-OIC developing countries is projected to decline (SESRIC 2018). Even the share of urban population is also increasing in all OIC member countries; however, some OIC countries such as Afghanistan, Burkina Faso, Chad, Comoros, Tajikistan, Guyana are relatively least-urbanised (SESRIC 2018). In this backdrop, the study focuses on sustainable land management and forest ecosystem for are of utmost necessity for the OIC member countries to enhance green management capacity and ultimately socio-economic growth and planned management to mitigate the impacts of desertification. By considering this, this study has focused on the factors behind desertification in the member countries of OIC as it has high policy implications in terms of identifying necessary actions for the future.

2. Method

For this study, secondary data has been considered in order to present an in-depth understanding and analysis of the selected study topic. Peer-reviewed journal articles; international reports and articles were explored. Key data were mainly taken from sources such as the World Bank (i.e. World Development Indicators Portal) and FAOSTAT (Food and Agriculture Organization Corporate Statistical Database) and other relevant UN organisations. This study has followed geographical classifications of OIC countries as per the Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC's) guidelines. For this study, 21 OIC member countries including Benin, Burkina Faso, Cameroon, Chad, Comoros, Côte d'Ivoire, Gabon, Gambia, Guinea, Guinea-Bissau, Mali, Mauritania, Mozambique, Niger, Nigeria, Senegal, Sierra Leone, Somalia, Sudan, Togo, Uganda are classified as Sub Saharan Africa (SSA); 19 member countries such as Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates and Yemen are classified as the Middle East and North Africa (MENA); nine countries including Afghanistan, Bangladesh, Brunei Darussalam, Guyana, Indonesia, Malaysia, Maldives, Pakistan, Suriname are classified as Asia and Pacific (AP) and the remaining eight countries such as Albania, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkey, Turkmenistan, Uzbekistan are classified as Europe and Central Asia (European Court of Auditors 2018).

3. Discussion

3.1. Factors of Desertification

3.1. 1. Aridity and Drought

Degradation of natural resources leading to desertification is more noticeable in Africa than in any other continents in the world. Aridity is one of the factors that are causing increasing pressure on land and water resources. Figure 1 depicts geographical distribution of drylands based on the aridity index (Aridity index is measured as average annual precipitation respect to potential evapotranspiration) in the world which considered TerraClimate precipitation and potential evapotranspiration from the year of 1980 and 2015. It represents that major share of aridity index less than 0.05 belongs to hyper-arid climate and 0.05-0.2 to arid climate covers mainly developing countries especially the SSA and MENA countries (URL3 2020).

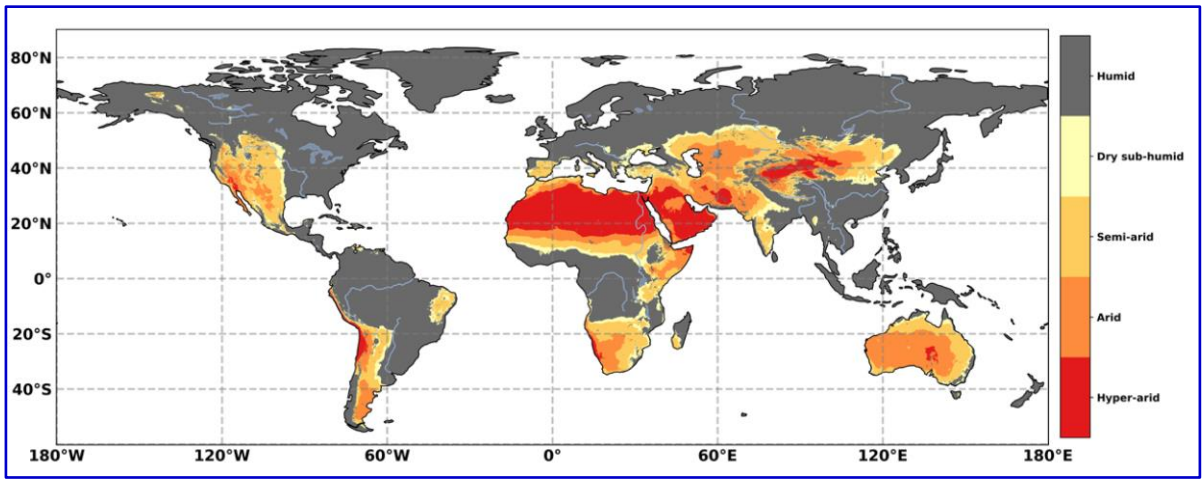

Figure 1. Geographical distribution of drylands based on the aridity in the world (URL3, 2020).

The OIC member countries of Sub-Saharan Africa are occupied by Sahara deserts that contain a prevalence of hyper-arid and arid lands which are mostly unsuitable for forestry or agricultural activities. The increased temperatures, heatwaves, aridity all are affecting the rain fed agricultural systems or forestry systems (URL3, 2020). Africa and Asia cover the major share of drylands in the world of which about 43% landmass is situated in Africa (UNCCD, UNDP and UNEP 2009) and 40% of in Asia (Millennium Ecosystem Assessment 2005), and it has increased to 45% in 2017 in Africa (UNCCD 2017) which indicates that Africa is the driest in the world. The Eastern part of African countries such as Sudan, Djibouti, and Somalia are occupying largely hyper-arid, arid and semi-arid zones (UNEP 1997). Countries under the MENA region also have substantial share of hyper-arid, semi-arid areas for instance extreme arid prevails in Egypt, Algeria, and Libya. The Eastern part of African countries such as Sudan, Djibouti, and Somalia are occupying largely hyper-arid, arid, and semi-arid zones (UNCCD 2017, UNEP 1997). The SSA countries such as Guinea-Bissau, Sierra Leone, Cote d'Ivoire, and Togo have very little cover dominated by the arid zones. Benin, Ghana, Gambia, south Nigeria, and south Senegal have little cover of their areas under semi-arid and sub-humid arid categories. However, the major vulnerability is attributed to countries of Sub Saharan and Central Asian dryland countries among the OIC countries. As per Millennium Ecosystem Assessment, major interior part of Sahel region is mainly semi-arid transition, the southern part is mainly dry sub-humid and the northern part is mainly arid and hyper-arid (Millennium Ecosystem Assessment 2005).

The OIC member countries under the Sahel, the Horn of Africa, and the Southeast Africa are the three key regions of Africa facing persistent drought once every 30 years. Droughts and subsequent famines became natural phenomena in this region. Djibouti and Somalia from Northeast Africa (also called the Horn of Africa), Mozambique from Southeast Africa and Sahel, the semi-arid region of western and North-Central Africa comprises Northern Senegal, Southern Mauritania, the great bend of the Niger River in Mali, Burkina Faso (formerly Upper Volta - Land of Incorruptible People), Southern Niger, North-Eastern Nigeria, South-Central Chad, and into Sudan is considered one of the most environmentally degraded countries in the world. Drought in this region has made worse on food security (Gül et al. 2019), intensifies huge influx of migration and so on in this region. Countries like Saudi Arabia, Syria, Jordan observed less of precipitation rates have caused

droughts. Even, newly desertified regions in the Middle East are also traced based on dust sources which estimated around 39% of all detected dust source points (Moridnejad et al. 2015). Figure 2 illustrates the global mean annual precipitation of the land surface for the period 1998-2013 from the Tropical Rainfall Measuring Mission (TRMM) data set (3B43). This data clearly captures the precipitation patterns of the land surface. Relatively higher precipitation among OIC countries are seen in Central African countries, Indonesia, Brunei, Malaysia and relatively lower precipitation is generally distributed in the Middle East countries and Central Asian countries.

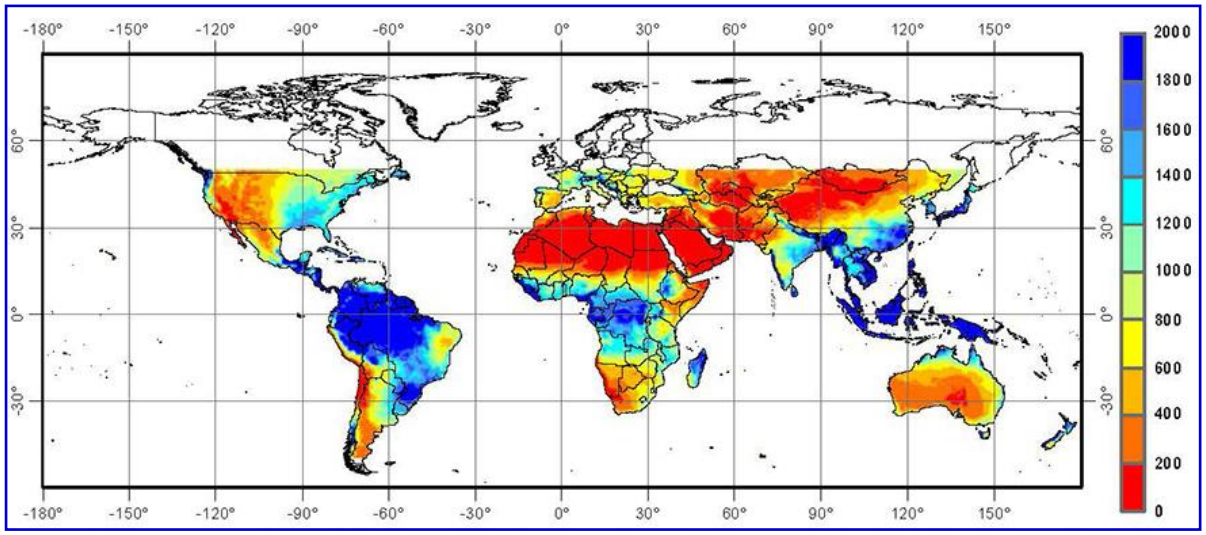

Figure 2. Mean annual precipitation of the land surface for the period 1998-2013 from the TRMM data set (3B43). Note: Annual precipitation larger than 2000 mm was specified as 2000 mm. (Centre for Sustainable Water Resources, 2014).

It is evident that the changing climate changes rainfall pattern, degrades land and therefore reduces the ability of plants and species. It exacerbates desertification processes starting from CO2 fertilisation to soil erosion, loss of soil organic carbon, expanding soil salinization and consequently decreasing soil fertility all ensure a significant component of desertification (ECA 2018, Thomas and Middleton 1993). Findings from climate model simulations for Africa represent that the dryland will shift and expand in OIC member countries under the SSA region, including Benin, Burkina Faso, Mali, Nigeria and Senegal (Cervigni and Morris 2016). Asian countries particularly Pakistan, Syria, Iraq, Iran influenced soil salinization, however climate change-induced sea level rise leads to saltwater intrusion that diminishes soil fertility in the countries of coastal areas in OIC countries. The drylands are particularly affected by climate change through changing rainfall patterns and land degradation, which reduces the ability of species and people to cope with dryland conditions. At least 90% of the land area of Burkina Faso, Egypt, Iraq, Kazakhstan, and Turkmenistan is classified as drylands (SESRIC 2019). Sahel region consisting of eight OIC member countries belongs to the African region. High population pressure with low resilience, cereal deficits, late rain, overgrazing, using poor harvest methods, and use of trees and vegetation for firewood etc. make these countries as hunger strike countries (SESRIC 2019, SESRIC 2017). The poor farming practices of these poor countries cause soil erosion, loss of soil fertility.

3.1. 2. Vegetation Cover Decrease

Among the OIC Member countries, the MENA and SSA are facing severe vegetation changes. From 1999 and 2012, the Satellite Pour l'Observation de la Terre (SPOT) Vegetation Products discloses that vegetation degradation is estimated around 4.67% of the Arab world. Major changes are shown in the western part of Morocco, the southern part of Sudan, the northern part of Syria and Somalia. However, positive changes are mostly found in the northern part of Algeria and Egypt, the southern part of Somalia and Iraq (Faour et al. 2016). The Sahel region in OIC member countries is facing a kind of vicious cycle that generated both human and natural factors. This vicious cycle further curbed vegetation cover reduction could also be ascribed by human activities, for instance, also such as unsustainable land use and planning practices (including overgrazing, overstocking, deep ploughing, and mono-cropping also led to a loss of vegetation and the resultant desertification (SESRIC 2019, SESRIC 2017, UNCCD 2017, Darkoh 1998). Droughts, population growth, unplanned urbanisation, unplanned land management in the Sahel region and central Asian countries such as

Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan are contributed to soil degradation, soil erosion etc. (Becerril-Piña and Mastachi-Loza 2020, URL3 2020, SESRIC 2019). The spatial distribution of the Normalized Difference Vegetation Index (NDVI) trends for the period of 1982 - 2012 in the Sahel region reflect the long-term rainfall distribution, for example at 10°N the rainfall is ~800 mm/yr and decreases progressively as one moves north, falling to 100 mm/yr at 20°N (Anyamba et.al, 2014). Figure 3 illustrates the global mean annual maximum NDVI 1982–2015 (Global Inventory Modelling and Mapping Studies NDVI3g v1).

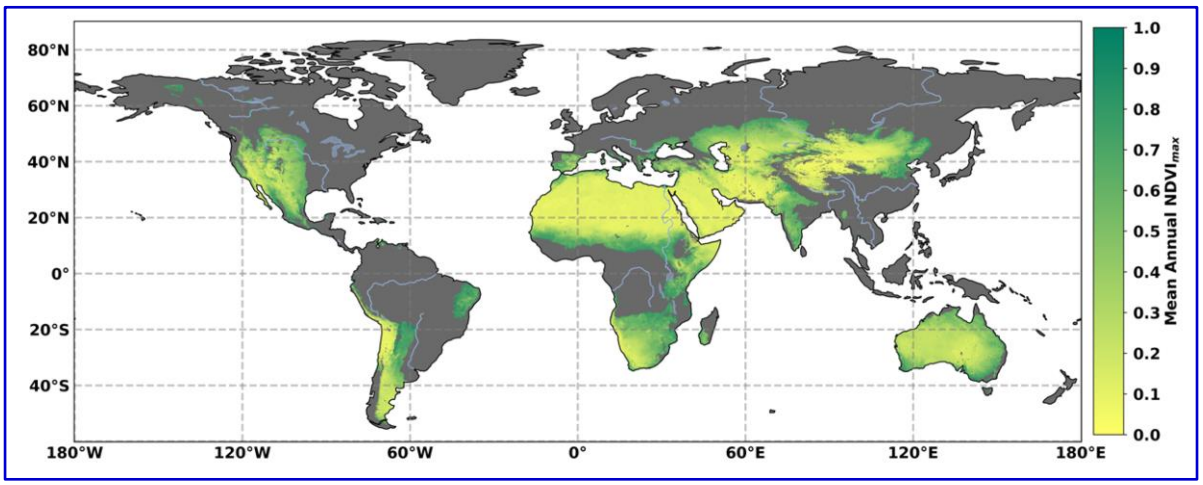

Figure 3. Mean annual maximum NDVI 1982–2015 in the world (URL3, 2020). (Non-dryland regions (aridity index >0.65) are marked in grey).

3.1. 3. Growth of Arable Land

Arable land means land under temporary crops where double-cropped areas are counted once, temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. The growth of arable land represents the growth of non-forest land, as an indicator of deforestation. The total land area in OIC member countries is 2.94 billion hectares, equals to 22.60% of the world's total land area (COMCEC Coordination Office 2019). Based on a calculation from 1990 - 2016, around 13% of arable land has been lost. The extent of non-agriculture land was increased by 3.43% during 2000-2010 due to massive urbanization, industrialization and so on and around 12km land goes under salinity due to climate change impact (Hasan et al. 2013). Another study by SESRIC in 2016 observed that there has been substantial land use change from agricultural to industrial in many OIC countries. Therefore, the average share of agriculture in the overall GDP of OIC countries decreased from 17.6% in 1990 to 10.2% in 2014 (SESRIC 2016). African countries such as Gambia, Sierra Leone, Togo, Benin, Uganda has relatively positive growth of arable land; however, mostly Arab and Asian countries such as Palestine, Turkey, Lebanon, Morocco, Syria, Bahrain, Yemen, Iran, Guyana, Afghanistan, Malaysia, Tunisia and Libya are losing arable land. Figure 4 illustrates top 20 countries had the highest percentage of arable land (% of land area) in 2016. Among the top 12 arable countries in OIC, nine of them are from Sub Saharan African countries, among them Togo, Gambia, Nigeria, Comoros and Uganda have more than 30% of arable land in respect of percentage of land area. Other countries (more especially Asia Pacific countries) of OIC such as Bangladesh and Pakistan have substantial share in growth of arable land represents 59.64% and 40.26% respectively in 2016. The major and gradual decline in land arability has found in Bangladesh, followed by Togo, Gambia, Pakistan, Nigeria, Comoros, Uganda etc.

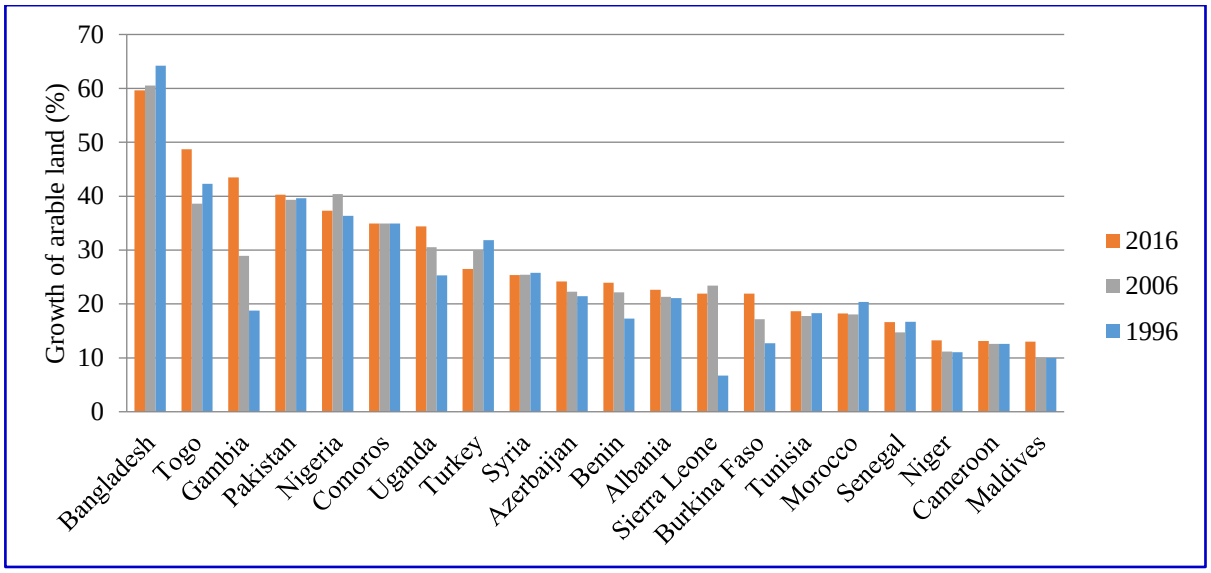

Figure 4. Growth of arable land in different years of OIC member countries (World Bank: World Development Indicators Database, 2020).

3.1.4. Lose of forest and yield

From 1990-2016, the OIC Member Countries have suffered forest loss 17.09 % of forest area (in sq km) (World Bank, 2020). By calculating the forest loss figure, the OIC countries are losing 4.74 football pitches of forest land in an hour. During this time, Sub-Saharan African countries reported the largest net loss of forest (23.52%), Asia Pacific countries are also lost forest around 16.68%. On the other side, MENA and ECA had a forest gain around 16.41% and 10.12% respectively (Fig. 5). Among the top five countries with the largest gain of forest area in the period 2006-2016 were Malaysia, Turkey, Gabon, Algeria and Sierra Leone. The top five countries with the largest loss of forest area over the same period were Sudan, Indonesia, Nigeria, Mozambique and Uganda.

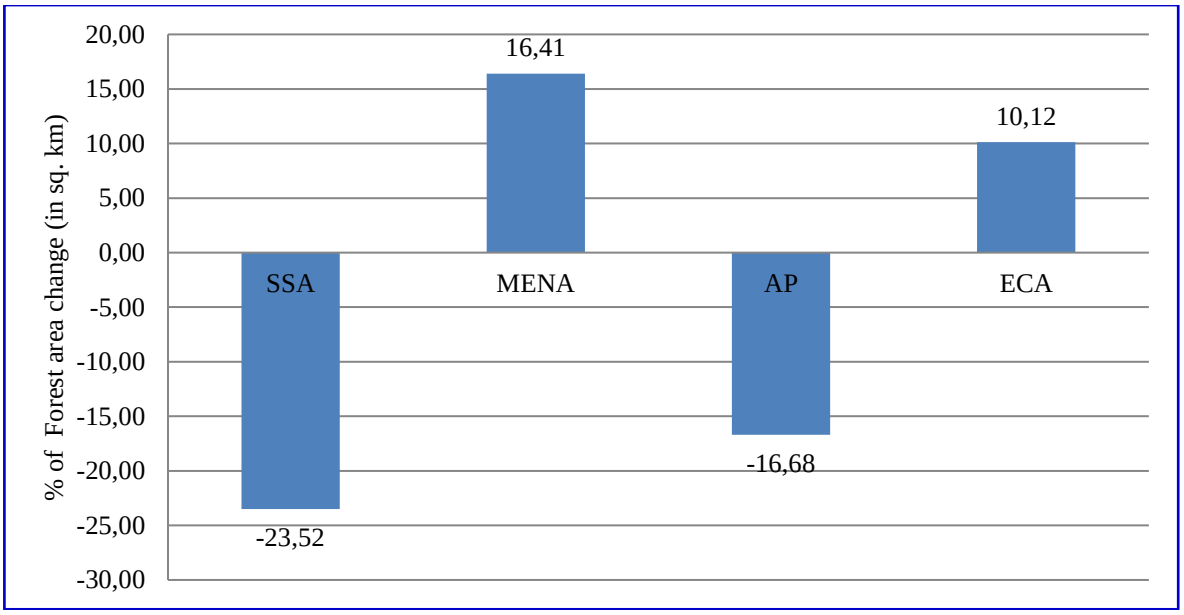

Figure 5. Forest area change (in sq km) of geographical region of OIC countries (World Bank: World Development Indicators Database, 2020).

As of 2016, only 16 OIC member countries have forest cover over 25% of their land area (Fig. 6). Among these countries, Gabon and Guinea-Bissau are located in Atlantic coast of Africa; in addition to Mozambique, Sierra

Leone, Cameroon, Benin, Cote'd Ivorie, Guinea are from SSA countries. However, other 13 countries under SSA are facing deforestation characteristics. Suriname, Brunei Darussalam, Malaysia and Indonesia from AP countries are also considered highest forest cover countries under AP in OIC. Among the OIC member countries, six OIC countries are also characterized by low deforestation and ranked among the top High Forest Cover Low Deforestation (HFLD) countries covering forest over 50%. Therefore, it can be stated here that 41 countries forest cover below 25% should gave special concentration of forestation.

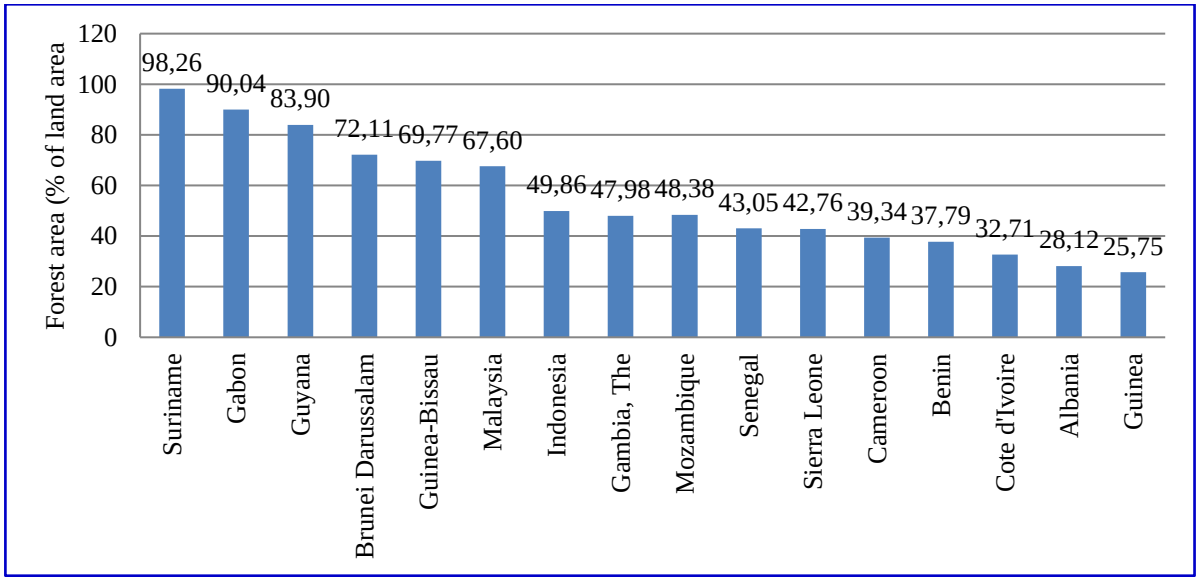

Figure 6. Forest area covering (25%) of their land area (World Bank: World Development Indicators Database, 2020).

The share of agriculture in total GDP of OIC countries on average amounted to only 10.4% in 2014, gradually declining from 12.0% in 2000 and 16.3% in 1990 (SESRIC 2016) due to number of various reasons. Among them climate change acts negative significant impact on yield in OIC member countries. SESRIC (2016) estimated that an increase 1°C in local temperature may result in 5-10% decline in yields for major cereal crops in semi-arid and tropic areas (SESRIC, 2016). Knox et al, (2012) study show that Sahara countries mean yield changes of -11.6%, −12.6% in maize, −10.6% in millet. Another projection by Schlenker and Lobell (2010) that crop production may be reduced by 17–22% due to climate change by 2050 in sub-Saharan Africa. Central Asian countries are also projecting a decrease in crop yields (Reyer et al. 2017). Even, the farmers in Africa are using "shifting cultivation" for producing enough crops which results removal of surface vegetation that creates deforestation (McNicol, Ryan and Williams 2015).

3.1.4. Globalization Phenomena

After the 1980s the world is more focused on market-oriented and market-dependent approaches or the so-called neoliberal policies that have a huge contribution on desertification. According to the Millennium Ecosystem Assessment 2005), neoliberalism amplified or attenuates the driving forces of desertification by eliminating national and regional barriers, weakening local and regional connections, and increasing the interdependence among people, between nations. Improved access to agricultural inputs (like fertilizers, pesticides, and farm machinery and tools) and export markets typically boosts productivity and growth. Again, selective forestry product items export to international markets embodied by international policies stimulates overproduction of many forestry items in those countries. For instance, in 2015, through bilateral trade flows on forestry items such as sawn wood, coniferous, particle board and OSB, newsprint, industrial roundwood, coniferous (export/import), plywood import values of the poorest countries of OIC especially SSA countries from developed countries valued only 30661 unites (m3 or tonnes) but the export values of sawn wood, non-coniferous all industrial roundwood, non-coniferous non-tropical (export/import), wood chips and particles, veneer sheets, plywood, sawn wood, coniferous, non-coniferous non-tropical (export/import) items were to the developed countries were 577538 unites (m3 or tones) which is around 19 times higher than import values (FAO STAT 2017). These increasing demands are undergoing extensive deforestation and forest degradation (Ryan et al. 2012). Figure 7 shows that the top 10 net forest depletion countries (% GNI) by country. In this

graph, all countries are belonging to Sub Saharan African countries. It indicates that SSA countries net depletion for forest resources imply the harvest rate exceeds the rate of natural growth. The country with the highest values in the OIC is Guinea and Guinea-Bissau, with a value of 15.24 and 15.01 respectively.

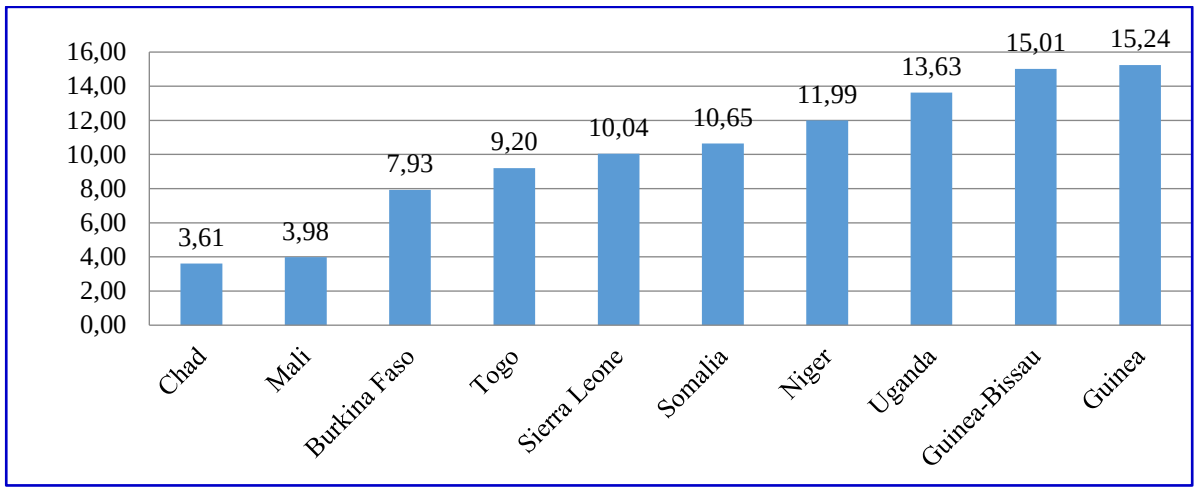

Figure 7. Top 10 net forest depletion countries (% GNI) in OIC (Joint Research Centre, European Commission, 2014).

In this graph, all countries are belonging to Sub Saharan African countries which indicate that SSA countries net depletion for forest resources imply that the harvest rate exceeds the rate of natural growth. The country with the highest values in the OIC is Guinea and Guinea-Bissau, with a value of 15.24 and 15.01 respectively. The existence of Chinese miners and loggers operating in SSA countries of OIC has also impact of destroying the environment that results deforestation (Becerril-Piña and Mastachi-Loza 2020, SESRIC 2019, Abdulai 2017, Koigi 2018). These Chinese miners are posing "aggressive prospecting" on mining in Africa, their illegal mining activities are destroying arable lands and rendering the virgin lands unproductive for agriculture (Antwi-Boateng and Akudugu 2020). Among the OIC member countries, Malaysia and Indonesia together are supply 85% of the world's Palm oil. The FAO added palm oil as a driving factor of deforestation because forests are cutting down to makes way for producing palm oil (URL1 2020). Another example on the world's largest cocoa producing country like Ghana and Cote d'ivorie, are signed with Cocoa and Forest Initiative (CFI) where chocolate companies committed to protecting and restoring forest areas that have been degraded by cocoa farming as well as improving sustainability (URL2 2020).

3.2. Challenges to Combat Desertification

The OIC member countries are facing a lot of challenges to combat desertification. These challenges can be stated as below:

- The absence of a comprehensive database of desertification is hindering the monitoring and implementation problems in OIC member countries.

- Among the OIC member countries, 21 countries are classified as Heavily Indebted Poor Countries (HIPC) by the World Bank (SESRIC 2019a). Poverty, conflict, prolonged drought etc. all are ubiquitous in these countries (URL3, 2020). In general, aridity, prolonged drought, conflict, lack of supportive political environment has already surpassed natural capacity of many OIC countries to meet its own food and other basic demands. In addition, the local condition the dryland populations are using antique agricultural practices, tools and machineries are adding extra pressure. These challenges are limiting the success of agricultural developments, land reclamation, management and cultivation. Considering food security as an urgent issue, the OIC formed OIC Food Security Institute in Kazakhstan in 2016. The institute is also focusing the problems that posed by desertification, deforestation, erosion and salinity issues to achieve food security targets.

- Around 26 OIC countries are facing some level of water scarcity and the unprecedented pressure on water resources in OIC countries is 12.2% (SESRIC 2018). It reduces the ability to produce enough food to meet the existing and growing population needs. Among the highly vulnerable countries of OIC, Chad is ranked first followed by Afghanistan, Guinea, Guinea-Bissau, Mozambique and Niger, with scores over 70. These

countries along with Sudan and Yemen are posing highest lack of coping capacity (SESRIC 2019b). Therefore, people in these countries are posing significant challenges to manage with their systems, existing resources and opportunities with adverse environment and climatic conditions.

- Misuse of land, overexploitation of resources at large extent, poorly managed environmental conditions all are adding pressure on natural resources in OIC countries. In addition, rapid population growths are increasing the level of natural resources deficit that loses land, loss of forests in OIC countries (SESRIC 2019). Particularly the OIC countries are urbanizing more rapidly than the other country groups and the world average. Over the last decade, the annual rate of urbanization in OIC was accounted over 3% per annum which is above the global percentage i.e. 2% annually (SESRIC 2019b). Such growth, exploitation of natural resources, lack of restoration or future preservation all are challenging to proper land management of OIC countries. In addition, as per the World Bank's Country Policy and Institutional Assessments database, the capacity for environmental management (both in terms of policies and institutions) in 30 OIC member countries scored in average 3.1 (out of 6) in 2017 indicates that these member countries are characterized by weak capacities (SESRIC 2019).

- Desertification has had an impact on women's and children's lives in various ways. Workloads and responsibilities have increased women are often excluded from participation in land conservation and development projects. The focus on gender-responsive activity towards achieving Land Degradation Neutrality (LDN) is still minimal despite various women participation programs found in the global sphare (UNCCD 2017a). MENA, the second most desertification impacted region of OIC had the highest level of gender gap (measures as economic participation and opportunity, educational attainment, political empowerment, health and survival) obtained a score of 0.61 in 2017 followed by SSA with a score of 0.65 in 2017. However, the ECA region of OIC, had relatively lower gender gap, obtained a score of 0.69 in 2017 which is demarked at the least impacted region in terms of desertification in OIC country (SESRIC, 2018a).

4. Conclusion and the Way Forward

Aridity and drought, decreased vegetation cover, land loss, growth of arable land etc. are the key environmental factors that have direct effects on desertification in OIC member countries. In addition, local phenomena such as unsustainable use of natural resources by the local people, and globalization phenomena also exacerbate desertification. The situation further exacerbates by the global climate change impact. As the least developed countries of OIC member countries are facing huge desertification challenges and difficulties to combat desertification, therefore, major initiatives should take for the SSA and MENA countries. The prevailing socio-economic and political problems should be reduced with adequate restoration of drylands and protection of natural forests towards achieving sustainability in this region. Considering the local condition, the dryland populations should reduce (more specifically should avoid) degradation by improving advanced agricultural methods and practices with modern tools and machinery. It will help to devise and up-scale remedial and preventive measures. Adding climate-resilient adaptation and mitigation technologies (for instance: use of drought-tolerant varieties, use of brackish and seawater desalination, reuse domestic wastewater, recycle agricultural drainage water, rainwater harvesting etc.) and increasing institutional and technological capacity of the local communities will provide a win-win approach in this respect. The active participation of civil society organizations and local non-government organisations can play a significant role in the implementation of the UNCCD 2018−2030 Strategic Framework (UNCCD 2018) as well as OIC's strategic vision.

The OIC as an international diplomatic organisation, therefore active participation in the international ground can lead success of member countries. In the case of the Kyoto Protocol, only 10 OIC member countries have ratified it whereas 46 members are in the state of accession. In case of the 'Paris Agreement', 43 OIC member countries have ratified it whereas 13 members have signed out but not ratified (SESRIC 2019). The OIC should take effective actions for making and implementing national based Reducing Emissions from Deforestation and Forest Degradation (REDD+) strategies, implement OIC Water Vision 2025- "working together for a water secure future", organize training and awareness program, developing country-wise institutional and technological capacity, collaborative partnership on forests all can reduce desertification and ensure sustainable land and environmental management. Active participation of OIC countries in international strategies, plans, commitments, forums, panels etc. can facilitate sustainable land, water and environment management. For instance, the Bonn Challenge is an international initiative where only 14 OIC member countries (Cameroon, Cote d'Ivoire, Nigeria, Niger, Uganda, Guinea, Kazakhstan, Mozambique, Bangladesh, Pakistan, Benin, Uzbekistan, Kyrgyzstan and Tajikistan) have submitted their pledges to the secretariat. These member countries

jointly committed to restore 34.1 million hectares of degraded land with economic benefits equaling to US$ 9889 million along with sequestration of 2.98 gigatons of CO2 by the end of 2030 (SESRIC 2019). These types of international strategies or plans or activities can expedite their anti-desertification activities.

In 2017, Six OIC member countries such as Algeria, Iran, Lebanon, Morocco, Tunisia, and Turkey signed the Agadir Commitment for strong cooperation and restore degraded forest landscapes by 2030 (URL3 2020). It also foresees cooperation on restoration with the Sahel region (Besseau, Graham and Christophersen 2018). A number of special-purpose initiatives in Africa and the world are visible such as the Tropical Forest Alliance 2020 (TFA2020) Initiative and the Africa Palm Oil Initiative (APOI), African Resilient Landscape Initiative, Astana Resolution to promote adaptation to and mitigation of climate change, restoration, regeneration etc. The African Forest Landscape Restoration Initiative (also called AFR100 initiative) which is also supported by the Bonn challenge is to bring 100 million hectares of land in Africa into restoration by 2030. The SSA countries except Comoros, Gabon, Gambia, Somalia are participating in these initiatives which should maintain its status-quo (Besseau, Graham and Christophersen 2018). As of today, 40 OIC member countries (except Albania, Afghanistan, Chad, Bahrain, Brunei Darussalam, Djibouti, Indonesia, Kazakhstan, Libya, Malaysia, Maldives, Palestine, Qatar, Suriname, Tajikistan, Turkmenistan and Yemen) have committed to set LDN (Land Degradation Neutrality) targets. It is commendable that except Chad, all SSA countries committed to set targets. This country specific target setting programs and actions will provide significant benefits in terms of mitigation and adaptation to climate change, as well as strengthening resilience of rural communities against climate shocks. The Great Green Wall of the Sahara and the Sahel Initiative of the SSA countries of OIC is a noticeable initiative by the African Union to combat climate change impact and desertification. However, the OIC member countries need to focus on widespread anti-desertification programs, prepare adaptation plans and policies, and reduce GHG emissions and so on. Besides the OIC status quo, interrelationship with other International organisations can improve forest planning, governance and management.

Despite numbers of initiatives and programs from various perspectives including Global Mechanism support to countries setting LDN targets as well as reducing challenges to combat desertification, this study proposes that there is a need to establish a Desertification Monitoring and Implementing Centre so that the OIC can take appropriate and coordinated actions in time. This center could help to implement various strategies, initiatives, policies, programs etc. as well as can be able to raise awareness, regional and local campaign and management of natural resources in the land and water sectors across the OIC member countries. As one of the main causal factors of desertification in OIC member countries is lack of awareness, inadequate data and information, therefore, this center can take extensive initiatives on awareness building for those involved in the forest and agricultural sector as well as collected data and information in due course. Initiatives through this center, the grass root people (both men and women) can be able to participate in identifying, developing, implementing, monitoring and evaluation of various initiatives and projects such as forest restoration, regeneration programs etc. Through this center, the OIC will be able to urge members to take action on desertification, deforestation as well as reducing poverty and promoting gender responsive development.

Finally, it can be stated here that the studied topic - desertification has been studying for decades and there is no clear projected future with relevance to regional scale at various studies in the world. As per geographical region of this study, the OIC member countries themselves are also facing similar types of problems. Therefore, up to date data and information, appropriate estimation and up to date satellite-based mapping are highly required that can make success through the suggested Desertification Monitoring and Implementing Centre.

Acknowledgement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. Thanks to SESRIC for giving me opportunity to contribute of its OIC Environment Report 2017.

References

1. **Abdulai, D. (2017).** Chinese Investment in Africa: How African Countries can position themselves to benefit from China's foray into Africa. New York: Routledge.
2. **Anyamba, A., Small, J. L., Tucker, C. J., Pak, E., W. (2014).** Thirty-two Years of Sahelian Zone Growing Season Non-Stationary NDVI3g Patterns and Trends. *Remote Sensing*, 6(4): 3101-3122.
3. **Antwi-Boateng, O., Akudugu, M., A. (2020).** Golden Migrants: The Rise and Impact of Illegal Chinese Small-Scale Mining in Ghana. *Politics and Policy*, 48(1), 135-140, https://doi.org/10.1111/polp.12342.

4. **Becerril-Piña, R., Mastachi-Loza, C.A. (2020).** Desertification: Causes and Countermeasures. In: Leal Filho W., Azul A., Brandli L., Özuyar P., Wall T. (eds) *Life on Land*. Encyclopedia of the UN Sustainable Development Goals book series. Springer, Cham.
5. **Besseau, P., Graham, S., Christophersen, T. (2018).** Restoring forests and landscapes: the key to a sustainable future. Global Partnership on Forest and Landscape Restoration, Vienna, Austria.
6. **Cervigni, R. and Morris, M. (2016).** Confronting Drought in Africa's Drylands: Opportunities for Enhancing Resilience. Washington, DC: World Bank; and Agence Française de Développement.
7. **COMCEC Coordination Office. (2019).** Agriculture Outlook 2019, Ankara, Turkey. http://www.sbb.gov.tr/wp-content/uploads/2019/10/Agriculture_Outlook_2019_October.pdf (02.01.2020).
8. **Darkoh, M., B. K. (1998).** The nature, causes and consequences of desertification in the drylands of Africa. *Land Degredation and Development*, 9(1): 1-20.
9. **European Court of Auditors. (2018).** Combating desertification in the EU: A growing threat in need of more action (Rep. No. 332018). European Court of Auditors, Luxembourg.
10. **Faour, G., Mhawej, M., Fayad, A. (2016).** Detecting Changes in Vegetation Trends in the Middle East and North Africa (MENA) Region Using SPOT Vegetation. *Cybergeo: European Journal of Geography*. CyberGeo. 2016.
11. **FAO STAT. (2017).** Global Forest Products Facts and Figures 2016. http://www.fao.org/3/I7034EN/i7034en.pdf (10.12.2017).
12. **Ginzky et al. (2017).** International Yearbook of Soil Law and Policy 2017. Springer
13. **Gül, E, Dölarslan, M., Uluğ, K., (2019).** Yarı Kurak Ağaçlandırma Alanlarında Çölleşme Eğiliminin Değerlendirilmesi: ÇAKÜ Orman Fakültesi, Prof. Dr. Abdülreşit BROHİ Araştırma ve Uygulama Ormanı Örneği. *Bartın Orman Fakültesi Dergisi,* 21(2): 506-516
14. **Joint Research Centre. (2017).** World Atlas of Desertification, European Commission. http://wad.jrc.ec.europa.eu/mapping (01.10.2017).
15. **Koigi, B. (2018)** Illegal Chinese Timber Business is Devastating Africa's Forests, https://www.fairplanet.org/story/illegal-chinese-timber-business-that-is-devastating-african-forest/ (13.07.2020)
16. **Knox, J., Hess, T., Daccache, A., Wheeler, T., (2012).** Climate change impacts on crop productivity in Africa and South Asia. *Environ. Res. Lett.*, 7, 34032, doi:10.1088/1748-9326/7/3/034032.
17. **Moridnejad, A., Karimi, N. and Ariya, P.A. (2015).** Newly desertified regions in Iraq and its surrounding areas: Significant novel sources of global dust particles. *J. Arid Environ.*, 116, 1–10, doi:10.1016/J.JARIDENV.2015.01.008.
18. **McNicol, M., I. Ryan, C., M. Williams, M. (2015).** How resilient are African woodlands to disturbance from shifting cultivation? *Ecological Applications*, 25(8): 2320–2336, Ecological Society of America.
19. **Millennium Ecosystem Assessment. (2005)**. Ecosystems and human well-being: Desertification Synthesis, https://www.millenniumassessment.org/documents/document.356.aspx.pdf (01.10.2017)
20. **Hasan et al. (2013).** Agricultural land availability in Bangladesh, Soil Resources Development Institute, Bangladesh.
21. **Ryan, C.M. et al**. (2012). Quantifying small-scale deforestation and forest degradation in African woodlands using radar imagery. *Global Change Biology* 18(1):243–257.
22. **Salcedo L, C. and Morarji, M. (2016).** Making women's voices count in community decision making on land investments. Washington DC: World Resources Institute. https://www.issuelab.org/resources/25829/25829.pdf (10.07.2020)
23. **SESRIC. (2016).** Agriculture and Food Security in OIC Member Countries 2016. https://www.sesric.org/files/article/537.pdf (10.07.2020)
24. **SESRIC. (2017).** OIC Environment Report 2017, http://www.sesric.org/files/article/586.pdf (02.03.2018).
25. **SESRIC. (2018).** OIC Water Report 2018: Transforming Risk into Dialogue and Cooperation. https://www.sesric.org/files/article/616.pdf (09.01.2018).
26. **SESRIC. (2018a).** OIC Women and Development Report 2018. https://www.sesric.org/files/article/646.pdf (07.07.2020)
27. **SESRIC. (2019).** OIC Environment Report 2019. https://www.sesric.org/files/article/675.pdf (02.01.2020).
28. **SESRIC. (2019a).** OIC Economic Outlook 2019: Mobilizing Financial Resources for Development. https://www.sesric.org/files/article/696.pdf (02.01.2020).
29. **SESRTC. (2019b)**. Urban Development in OIC Countries: Towards Sustainable Urbanization.
30. **UNDP/UNSO. (1997).** Aridity zones and dryland populations: an assessment of population levels in the World's dry lands. UNSO/UNDP, New York.
31. **UNCCD. (2014).** Desertification the Invisible Frontline. http://www.unccd.int/Lists/SiteDocumentLibrary/Publications/NEW_Invisible_%20Front_Line_%20EN.pdf (10.02.2018).

32. **UNCCD. (2017).** Global land outlook. UN convention to combat desertification, Bonn
33. **UNCCD. (2017a).** Overview of gender mainstreaming in the implementation of the Convention: 1998-2018, ICCD/COP(13)/CRP.1
34. **UNCCD. (2018**). The future strategic framework of the Convention. https://www.unccd.int/sites/default/files/relevant-links/2018-08/cop21add1_SF_EN.pdf (06.07.2020)
35. **UNCCD, UNDP and UNEP. (2009).** Climate Change in the African Drylands: Options and Opportunities for Adaptation and Mitigation. https://www.droughtmanagement.info/literature/UNCCD_climate_change_african_drylands_2009.pdf (07.10.2017).
36. **UNEP. (1997).** World Atlas of Desertification, 2ed. United Nations Environment Programme, London.
37. **URL-1. (2020).** http://www.fao.org/sustainable-forest-management/toolbox/modules/reducing-deforestation/in-more-depth/en/?type=111 (07.07.2020)
38. **URL-2. (2020).** https://www.worldcocoafoundation.org/wp-content/uploads/2020/02/Pathway-2020.pdf. WCF Strategy: Pathway to Sustainable Cocoa, (07.07.2020).
39. **URL-3. (2020).** https://www.ipcc.ch/site/assets/uploads/sites/4/2019/11/06_Chapter-3.pdf. Desertification
40. **World Bank. (2017).** World Bank Data from World Development Indicators Portal, 2017. http://data.worldbank.org/data-catalog/world-development-indicators (07.10.2017).
41. **World Bank. (2020).** World Bank Data from World Development Indicators Portal, 2020. http://data.worldbank.org/data-catalog/world-development-indicators (07.07.2020).