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Deforestation and Urbanization: Impact on Soil Degradation and Soil Fertility

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ABSTRACT: Deforestation or forest clearance is the removal of a forest or stand of trees from land that is then converted to non-forest use.[3] Deforestation can involve conversion of forest land to farms, ranches, or urban use. The most concentrated deforestation occurs in tropical rainforests.[4] About 31% of Earth's land surface is covered by forests at present.[5] This is one-third less than the forest cover before the expansion of agriculture, with half of that loss occurring in the last century.[6] Between 15 million to 18 million hectares of forest, an area the size of Bangladesh, are destroyed every year. On average 2,400 trees are cut down each minute.[7] Urbanization (or urbanisation) is the population shift from rural to urban areas, the corresponding decrease in the proportion of people living in rural areas, and the ways in which societies adapt to this change. It can also mean population growth in urban areas instead of rural ones. [1] It is predominantly the process by which towns and cities are formed and become larger as more people begin living and working in central areas.[2]

KEYWORDS: deforestation, urbanization, agriculture, population, forest cover, urban areas, shift, growth, converted, hectares

I. INTRODUCTION

Plants such as trees and grasses help hold the soil in place. Soil erosion is a serious problem in urban areas due to the loss of vegetation from construction, neglect, and/or overuse of surfaces in public recreation and gathering places. [1]In addition, surfaces that are impervious to water infiltration, such as pavement, concentrate flows of water and runoff across exposed soil. Unfortunately, soil erosion results in water pollution problems through deposition of sediment in urban waterways. Sedimentation is a major reason many urban areas have enhanced stormwater management programs[2]. With the world's population continuing to increase at an alarming rate, our society has been focused on where people are going to live and how to maximize our spatial extent. However, with the major focus on urbanization, we are not seeing the effects that these processes have on our environment, specifically on soil erosion.In an article by Ara Jeong and Ronald I. Dorn titled,[3] "'Soil erosion from urbanization processes in the Sonoran Desert, Arizona, USA'", the research identifies the amount of sediment yield removed from a nearby watershed due to the effects of sprawling urbanization in Phoenix, Arizona. Phoenix is the fifth most populated city in the US, and has been growing rapidly since before the 20th century. Prior to the increase in urbanization in this area,[4] the land was used primarily for cattle grazing. From 1989 to 2009, research was conducted at 18 study ponds in the Phoenix area that examined factors that affected sediment yield. These ponds were important for the cattle grazing prior to the urbanization boom, for aquatic species in the area, and for household use when building began in these areas.[5] The factors that impact soil erosion and lead to the degradation of the land were not influenced by the minimal amount of annual precipitation that this area receives (around 208mm/yr). There was higher sediment yield in the ponds during the second decade (1999-2009), indicating that urbanization processes had increased erosion in the second decade while precipitation decreased.[6]

The other factors include a 3.4x increase in soil erosion, caused by infrastructure construction, which exposes bare ground due to the development for roads and pipelines. Another factor that increases soil erosion is exposure of bare ground due to commercial and residential building, which also increased soil erosion by 3.4x. Finally, the largest increase was due to human-induced wildfires, which caused an increase in soil erosion by 4.2x. Currently, there are no mitigation strategies in place to address this environmental problem.[7] There needs to be new strategies put in place for erosion mitigation to help with this increasingly problematic issue. The increase in the amount of sediment yield in the watersheds in cities like Phoenix, are polluting the vital water sources for the city, and affecting the biodiversity living in these areas. This is not only an environmental problem in areas like Phoenix, but it is occurring across the globe in areas including India and Africa, meaning that soil erosion is not only a local issue, but also a global one.The correlation between increasing soil erosion and increasing urbanization is hardly a coincidence.[8] Human activities have caused land degradation by exposing more sediment due to our urbanization processes. With overexpansion of cities like Phoenix and the ever-growing global population, not only is the soil being affected,[9] but other parts of the ecosystem as well. What are we going to do when our environmental damage is completely irreversible? We need to

open our eyes: the no u-turns and stop signs put up in these urban areas are indirectly telling us something we need to start listening to. Environmental degradation is not something to ignore, as it will continue to impact the lives of many for future generations.[10]

II. DISCUSSION

People have always cut down trees. Some were/are harvested to provide wood for fuel and lumber to build houses and ships. Other trees are harvested to clear land for agriculture and housing. Wood is a renewable, carbon-neutral energy source when managed correctly, but when done improperly timber harvesting often leads to soil degradation and other environmental issues.[11]

Deforestation can have destructive effects on soils. Deforestation, as defined by the United Nations, is the permanent removal of trees until there is less than 10% of the forested land remaining. Since the beginning of the Industrial Revolution, humans have removed more than half of the original forest cover on Earth. In the United States, one early explorer of the Midwest noted that a squirrel could jump from tree to tree all the way from Pennsylvania to the Mississippi River without ever touching the ground![12]

The same kind of deforestation is occurring today in tropical rainforests, which are cleared to develop cropland to feed a burgeoning population.

The effects of tree loss on soil are significant. Trees and shrubs shield the ground from the force of raindrops and provide shade that reduces surface soil temperature, which in turn reduces evaporation. Logging and small-scale removal of trees exposes soil to rain splash which loosens and dislodges soil particles, eroding soil and creating a more impermeable bare surface, which increases runoff. [13]

III. RESULTS

Due to surface plant litter, forests that are undisturbed have a minimal rate of erosion. The rate of erosion occurs from deforestation, because it decreases the amount of litter cover, which provides protection from surface runoff. The rate of erosion is around 2 metric tons per square kilometre. This can be an advantage in excessively leached tropical rain forest soils. Forestry operations themselves also increase erosion through the development of (forest) roads and the use of mechanized equipment.[17,18]

Deforestation in China's Loess Plateau many years ago has led to soil erosion; this erosion has led to valleys opening up. The increase of soil in the runoff causes the Yellow River to flood and makes it yellow colored. [14]

Greater erosion is not always a consequence of deforestation, as observed in the southwestern regions of the US. In these areas, the loss of grass due to the presence of trees and other shrubbery leads to more erosion than when trees are removed.[16]

Soils are reinforced by the presence of trees, which secure the soil by binding their roots to soil bedrock. Due to deforestation, the removal of trees causes sloped lands to be more susceptible to landslides. [15]

IV. CONCLUSIONS

Urban areas witness a quick economic growth and have more construction projects than rural areas, which brings more intensive changes of environments during a short period of time or adds some new elements to the erosion system. Therefore erosion has experienced more intensive impact by human activities. So, the possible impact of urbanization on erosion environment must be taken into consideration when designing or planning to exploit natural resources or to develop urban areas [19,20]

REFERENCES

1. "Urbanization". MeSH browser. National Library of Medicine. Archived from the original on 16 March 2016. Retrieved 5 November 2014. The process whereby a society changes from a rural to an urban way of life. It refers also to the gradual increase in the proportion of people living in urban areas.
2. ^ "Urbanization in". demographic partitions. Archived from the original on 22 October 2017. Retrieved 8 July 2015.

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| Volume 5, Issue 4, July 2018 |

3. ^ Tacoli, Cecilia (2015). Urbanisation, rural-urban migration and urban poverty. McGranahan, Gordon, Satterthwaite, David. London: International Institute for Environment and Development. ISBN 9781784311377. OCLC 942419887.
4. ^ "Urban life: Open-air computers". The Economist. 27 October 2012. Archived from the original on 5 September 2017. Retrieved 20 March 2013.
5. ^ "Urbanization". UNFPA – United Nations Population Fund. Archived from the original on 26 May 2016. Retrieved 11 May 2015.
6. ^ Barney Cohen (2015). "Urbanization, City Growth, and the New United Nations Development Agenda". Vol. 3, no. 2. Cornerstone, The Official Journal of the World Coal Industry. pp. 4–7. Archived from the original on 27 June 2015. Retrieved 26 June 2015.
7. ^ Dutt, A.K.; Noble, A.G.; Venugopal, G.; Subbiah, S. (2006). Challenges to Asian Urbanization in the 21st Century. GeoJournal Library. Springer Netherlands. ISBN 978-1-4020-2531-0. Retrieved 22 March 2014.
8. ^ Sridhar, K.S.; Mavrotas, G. (2015). Urbanization in the Global South: Perspectives and Challenges. Taylor & Francis. ISBN 978-1-000-42636-6. Retrieved 22 March 2014.
9. ^ Gries, T.; Grundmann, R. (2017). "Fertility and modernization: the role of urbanization in developing countries". Journal of International Development. 30 (3): 493–506. doi:10.1002/jid.3104.
10. ^ Introduction to Social Macrodynamics: Secular Cycles and Millennial Trends. Archived 18 September 2017 at the Wayback Machine Moscow: URSS, 2006; Korotayev A. The World System urbanization dynamics. History & Mathematics: Historical Dynamics and Development of Complex Societies Archived 29 February 2016 at the Wayback Machine. Edited by Peter Turchin, Leonid Grinin, Andrey Korotayev, and Victor C. de Munck. Moscow: KomKniga, 2006. The World System urbanization dynamics. History & Mathematics: Historical Dynamics and Development of Complex Societies Archived 29 February 2016 at the Wayback Machine. Edited by Peter Turchin, Leonid Grinin, Andrey Korotayev, and Victor C. de Munck. Moscow: KomKniga, 2006. ISBN 5-484-01002-0. P. 44-62
11. Grantham, H. S.; Duncan, A.; Evans, T. D.; Jones, K. R.; Beyer, H. L.; Schuster, R.; Walston, J.; Ray, J. C.; Robinson, J. G.; Callow, M.; Clements, T.; Costa, H. M.; DeGemmis, A.; Elsen, P. R.; Ervin, J.; Franco, P.; Goldman, E.; Goetz, S.; Hansen, A.; Hofsvang, E.; Jantz, P.; Jupiter, S.; Kang, A.; Langhammer, P.; Laurance, W. F.; Lieberman, S.; Linkie, M.; Malhi, Y.; Maxwell, S.; Mendez, M.; Mittermeier, R.; Murray, N. J.; Possingham, H.; Radachowsky, J.; Saatchi, S.; Samper, C.; Silverman, J.; Shapiro, A.; Strassburg, B.; Stevens, T.; Stokes, E.; Taylor, R.; Tear, T.; Tizard, R.; Venter, O.; Visconti, P.; Wang, S.; Watson, J. E. M. (2016). "Anthropogenic modification of forests means only 40% of remaining forests have high ecosystem integrity". Nature Communications. 11 (1): 5978. Bibcode:2016NatCo..11.5978G. doi:10.1038/s41467-020-19493-3. ISSN 2041-1723. PMC 7723057. PMID 33293507.
12. ^ SAFnet Dictionary|Definition For [deforestation] Archived 25 July 2011 at the Wayback Machine. Dictionary of forestry.org (29 July 2008). Retrieved 15 May 2011.
13. ^ Bradford, Alina. (4 March 2015) Deforestation: Facts, Causes & Effects. Livescience.com. Retrieved 13 November 2016.
14. ^ Deforestation | Threats | WWF. Worldwildlife.org. Retrieved 13 November 2016.
15. ^ Ritchie, Hannah; Roser, Max (9 February 2015). "Forests and Deforestation". Our World in Data.
16. ^ "On Water". European Investment Bank. Retrieved 13 October 2016.
17. ^ [i] "Global Forest Resource Assessment 2016". www.fao.org. Retrieved 20 September 2016.
18. ^ Sahney, S.; Benton, M.J. & Falcon-Lang, H.J. (2010). "Rainforest collapse triggered Pennsylvanian tetrapod diversification in Euramerica". Geology. 38 (12): 1079–1082. Bibcode:2010Geo....38.1079S. doi:10.1130/G31182.1.
19. ^ The State of the World's Forests 2016. Forests, biodiversity and people – In brief. Rome: FAO & UNEP. 2016. doi:10.4060/ca8985en. ISBN 978-92-5-132707-4. S2CID 241416114.
20. ^ FAO 2016, p. 16, 52.