**Outline the most serious threats posed to the physical environment and vulnerable populations by soil degradation (10)**

Soil degradation is defined as the physical loss (erosion) and the reduction in quality of topsoil associated with nutrient decline and contamination. With 20 million square kilometers of soil already degraded worldwide and with the world population growing, it is becoming an increasingly important problem for humanity. It includes wind and water erosion, biological degradation, physical degradation or chemical degradation. The can all be the effect of human activity and/or by the natural environment (such as increased rainfall, flashfloods or rising temperatures). The physical environment is often harmed severely through soil degradation and this of course affects human populations too. The main threats are erosion of fertile topsoil, contamination of soil and desertification.

Fertile topsoil is essential for growing crops and it stores minerals, nutrients and carbon. 84% of all soil degraded is caused by water and wind. Both wind and water erosion are mostly the effect of human soil mismanagement. The reduction of the natural vegetative cover, for example in deforestation, or burning of crop stubble and roots makes soil especially susceptible to erosion, as the topsoil has no protection. The type of crop, that is grown on a piece of land can also affect soil structure and protection level (crops that expose the soil for long periods after harvesting or planting offer very little protection). Instable soil with an eroded structural stability can easily be carried away by winds or washed away by water (from rain as a natural example). For water, this is called runoff. Runoff is heavily increased when the soil is at a long and steep slope and the soil has a reduced capability of water infiltration and storage. Runoff, as well as wind erosion, also carries nutrients and minerals away with the topsoil, which are needed for the growth of crops.

In some cases, soil doesn’t have to be carried away to be degraded; contaminated soil has the same negative effect on potential planting of crops. Inappropriate use of pesticides and fertilizers and un-sustainable land use practices like excessive irrigation or the growing of monocultures (usually by agro-industrializations) can remove important nutrients from the soil and make it contaminated. The main thrive behind these practices are economical, as many industries or farmers only want to increase their profits. India’s cropland has grown steadily from 99.3 million hectares in 1950 to 170 million largely due to the Green Revolution. India has increased consumption of insecticides, herbicides and fungicides from 24,000 tons in 1971 to over 82,000 tons, being the fourth largest fertilizer consumer in the world. This has led to a large increase in productivity but also to increased concern, as fertilizers leach into ground water and results into increased degradation. Acidification is also a serious problem. It can be caused by acid rain coming from pollution and can cause leaching of toxic metals, harming crops. Salinization is also a growing problem. Capillary action can transport salts to the soil surfaces, where it accumulates due to evaporation. Saline soils can harm crops and therefore make the land unusable.

Desertification is the process of fertile land turning into desert. Desertification permanently makes soil infertile, so neither can crops be grown, nor can it be used for grazing cattle. Adding to that, deserts are very vulnerable to wind erosion. The soil is left without any nutrients or water and this change is very difficult to reverse. Around a third of china is desert (area of 2.6 million square kilometers); with 65% of China’s desert is a result of desertification. Causes of desertification are overgrazing, draining of water resources, deforestation, overpopulation and pollution from increased industrialization. Its effects are, that growing proportions of China’s land can no longer be used for crop growth, which has a negative economical effect. Furthermore, deserts can cause sandstorms, as seen recently in Beijing.

Soil degradation is becoming a huge threat to vulnerable populations as it effectively decreases the amount of land that can be used for food production. Soil productivity decreased on 16% of agricultural land in developing countries and 75% of Central America’s, 20% of Africa’s and 11% of Asia’s soil has been degraded severely. Decreased food production causes rise in food prices all over the world, as the world population also rises and demand for food increases. This can have severe effects on poorer populations that are already under the threat of hunger.