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Perspective of the rehabilitation of marginal areas: the case of *Lablab purpureus* (L.) Sweet

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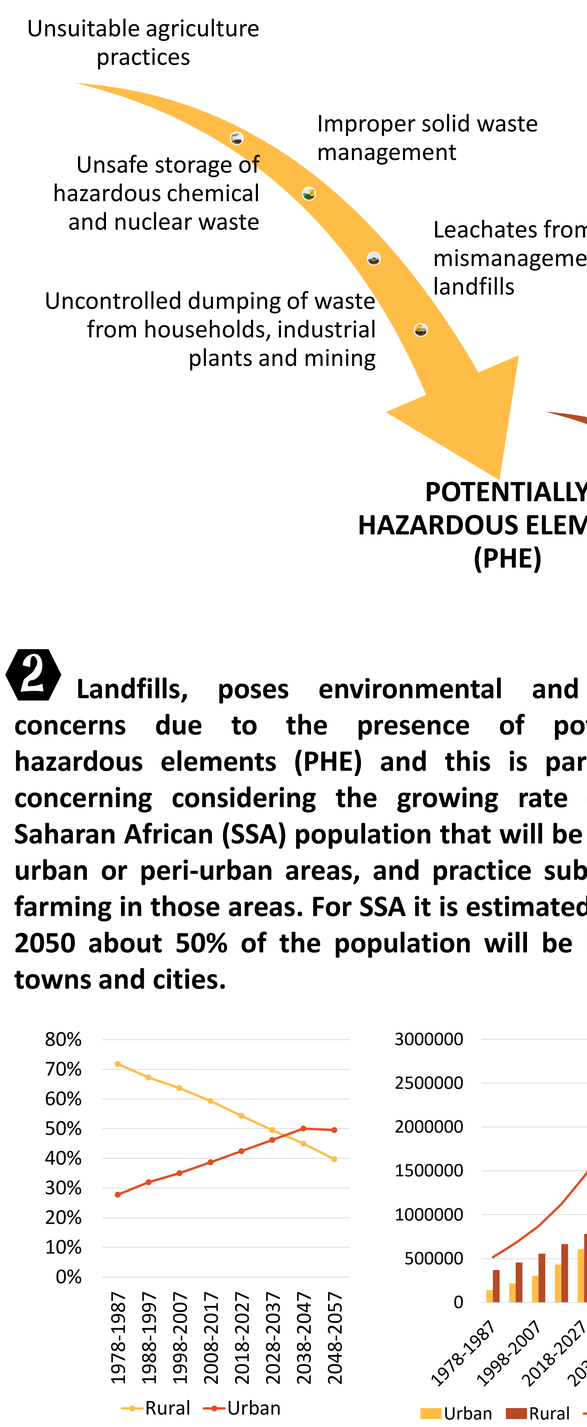
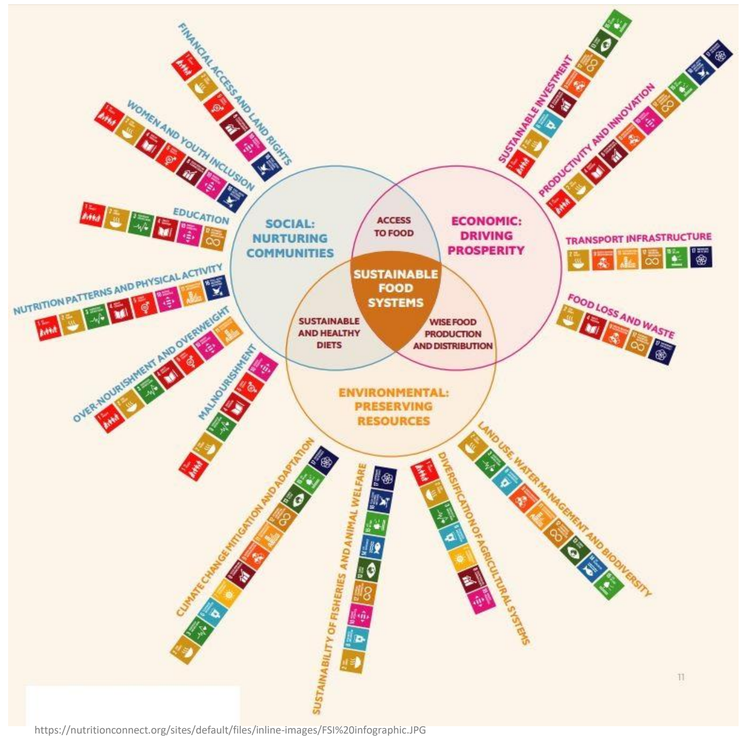


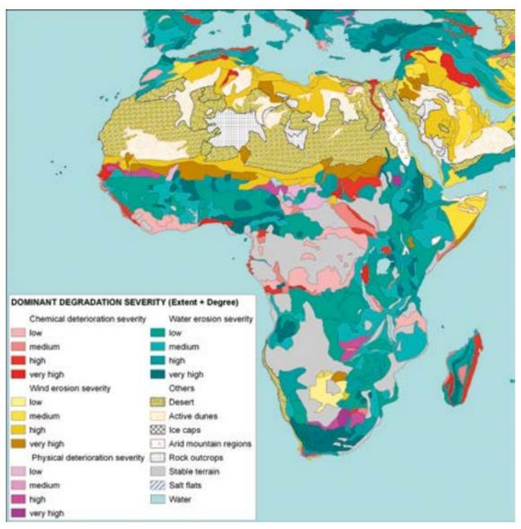
1 **It is estimated that the world population reach 9.1 billion in 2050 resulting in increasing food demand and consumption, but also waste production. Moreover, to help achieve the goals set by the 2030 Agenda for Sustainable Development, it is imperative to develop sustainable strategies for the recovery marginal lands (e.g. landfills or abandoned mining areas) and create conditions for agriculture activities. Thus, there is a need to increase agricultural production and to create sustainable waste management approaches. Several landfills pose health and environmental concerns associated to non-selective deposition of wastes, which present potentially hazardous elements (PHE), and inexistence of environmental management systems. Therefore, leachates rich-in PHE can spread to adjacent areas leading to soil and water contamination.**



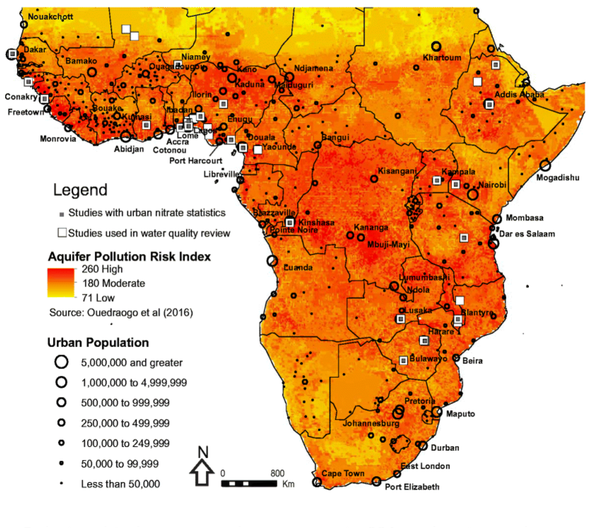
https://nutritionconnect.org/sites/default/files/inline-images/FSI%20infographic.JPG

2 **Landfills, poses environmental and health concerns due to the presence of potentially hazardous elements (PHE) and this is particularly concerning considering the growing rate of Sub-Saharan African (SSA) population that will be living in urban or peri-urban areas, and practice subsistence farming in those areas. For SSA it is estimated that by 2050 about 50% of the population will be living in towns and cities.**

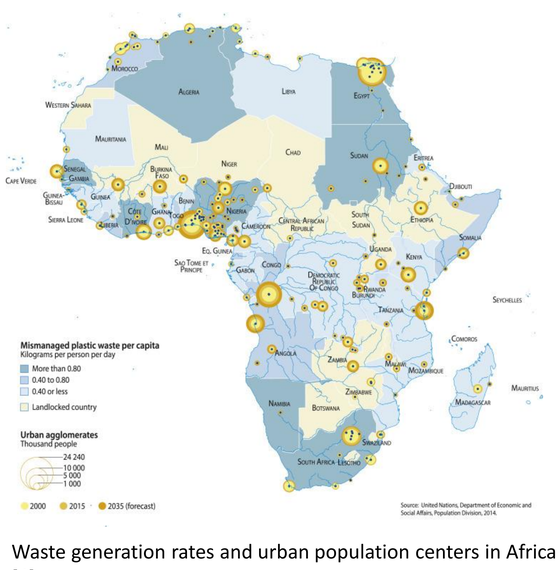
Annual growth of population in rural and urban regions in sub-Saharan Africa within the period of 1950s and to future projections until the 2050s [1]



Soil degradation severity, by type extent, and degree [2]



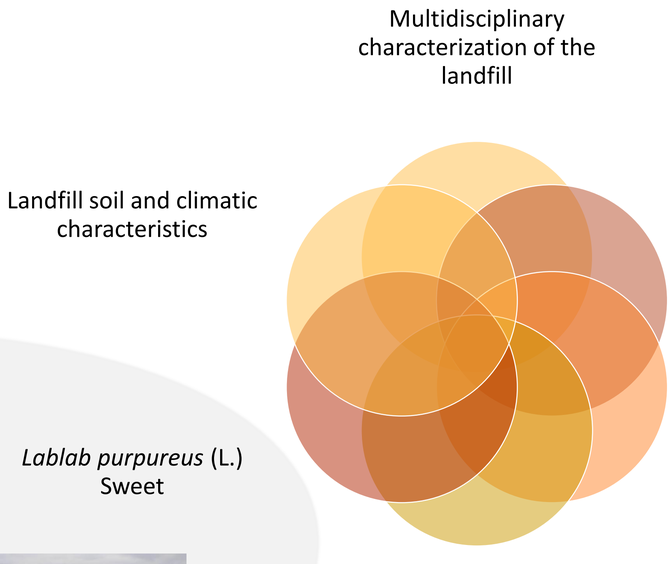
Relationship between urban centres in SSA and estimated aquifer pollution risk. [3]



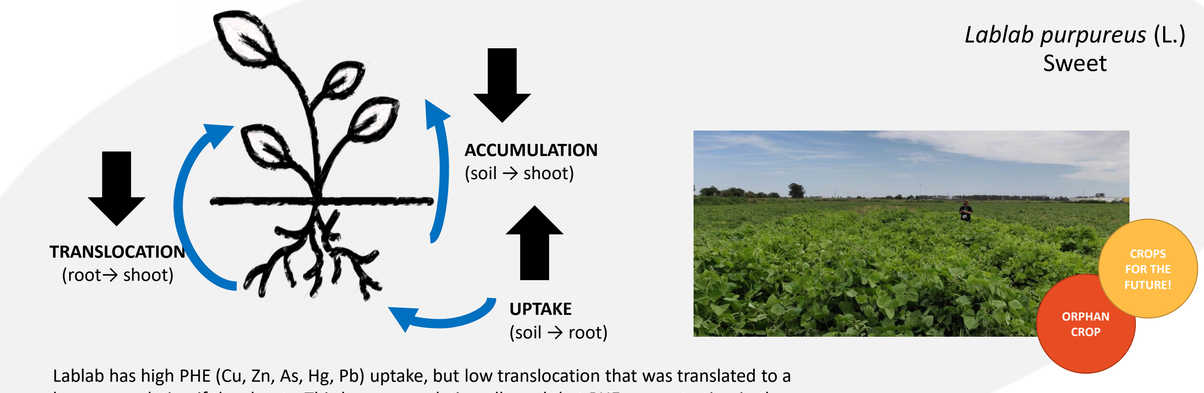
Waste generation rates and urban population centers in Africa [4]

3 **In SSA, urban and peri-urban agriculture, is essentially, a "local food" system that provides urban populations with a wide range of fruit and vegetables, but also herbs, roots, tubers and ornamental plants that are grown within the city or in its surrounding areas. Where irrigation is fully available – the case in most African cities – urban and peri-urban farmers establish plots along permanent water courses, including rivers, streams, drains and sewage canals, or in marshy areas where they dig wells to reach groundwater. However, rudimentary sanitation and cities with poor domestic and industrial waste management result in severely polluted water from streams, urban drains, and even groundwater, threatening food safety**

4 **The recovery of landfills, in addition to other environmental management measures, can involve the development of a secure plant cover that creates conditions for agriculture activities, while protecting the food-chain, but also improve environmental and landscape impacts. Plant species selected for green cover should have the ability to decrease the mobility or immobilize PHE in the rhizosphere. Furthermore, these plant species should also have low PHE translocation factors from the soil/roots to the shoots. Plants with these characteristics are not common, and it is necessary to increase our efforts to identify them. Moreover, in the scope of SSA it is important that these species should be native and known by the population. One of such plants is *Lablab purpureus* (L.) Sweet, commonly known as Lablab.**



5 **Lablab is a legume from East Africa, better adapted to long periods of drought than common bean or cowpea, both of which have been preferred in African agricultural production systems. Nevertheless, Lablab is still produced locally for household consumption and for the sustainability of the African smallholder multifarming system [1]. Lablab multifunctionality (food, feed, green manure) and drought resistance make this crop a potential candidate for the rehabilitation of contaminated areas.**



Lablab has high PHE (Cu, Zn, As, Hg, Pb) uptake, but low translocation that was translated to a low accumulation if the shoots. This low accumulation allowed that PHE concentration in the shoots to be tolerable to domestic animals for plants [5].

6 **It is important to point that the characteristics of each landfill are different as well as climatic conditions where is located the landfill, thus the initial and multidisciplinary characterization of the study area is crucial.**
Moreover, the ecophysiological plant behaviours, namely PHE accumulation in the edible part, depends on plant species and edafoclimatic conditions, so more studies should be done in order to assess the impact in the food-chain.

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