



Agriculture and the Environment

AgriConnect Webinar

The Agenda – What will we do today?

- Welcome and Opening Remarks
- About AgriConnect
- Some AgriConnect Do's and Don'ts
- About World Environment Day
 - The Uniqueness of our ecosystems and farms
- Viewing of Video - World Environment Day 2024: <https://www.worldenvironmentday.global/>
- Presentation - Agriculture and the Environment
 - Environmental Services Vital to Agriculture
 - Agricultural Practices, Population and Food Security
 - The impact of climate change on Agriculture
 - Implications of agriculture on land and water resources
 - Pesticide use and the impacts on agriculture resources and human health
 - Bring back pollinators – bats, bees, birds
 - Sustainable agriculture, organic agriculture, conservation agriculture and their benefits
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- Practical Actions that you can take to protect the land and soil
 - Tips on how to make agriculture sustainable
 - Guidelines for Building a Compost Heap
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- Introducing Nature Positive Universities

theSOFTtribe

In partnership with:



AGRICONNECT

... AgriConnect... digitally empowering our youth to lead the modernization of agriculture in Ghana

What is AgriConnect? – Viewing of Video


The Mastercard Foundation has partnered with theSOFTtribe to develop and implement the “Devices and Connectivity: Bridging the devices and connectivity gaps for Students in Agriculture” Program, now called AgriConnect

AgriConnect will supply 10,000 agriculture and agriculture-related students across 10 tertiary institutions (Universities and TVETs) in Ghana with:

A laptop and internet connectivity

Supplementary educational content for specific value chains in Agriculture, Agri-business and Entrepreneurship, and digital literacy to augment the existing curricula taught in academic institutions to better prepare students for entering the labour market and accessing meaningful and fulfilling work after graduation.

Access to our user-friendly and accessible bespoke digital platform to participate in these supplemental courses.



The first and foremost role of agriculture is the production of food, and access to food is the greatest life sustaining priority, second only to the availability of potable water.



3 Main Functions of Agriculture



Environmental Functions – agriculture and related land use influence the natural resource system and can have either beneficial or harmful effects on the environment. This function is relevant to a number of critical global environmental problems including, loss of biodiversity, climate change, desertification, water quality and availability, and pollution



Economic Functions – agriculture is responsible for the delivery of a wide range of non-food goods and services, as well as the provision of employment and livelihoods, and as such remains a principal force in sustaining the operation and growth of the whole economy for all countries throughout the world. The agricultural industry is therefore a dominant component of the global economy, which must take into account the trade-offs, and synergies that can exist between the different functions of agriculture.

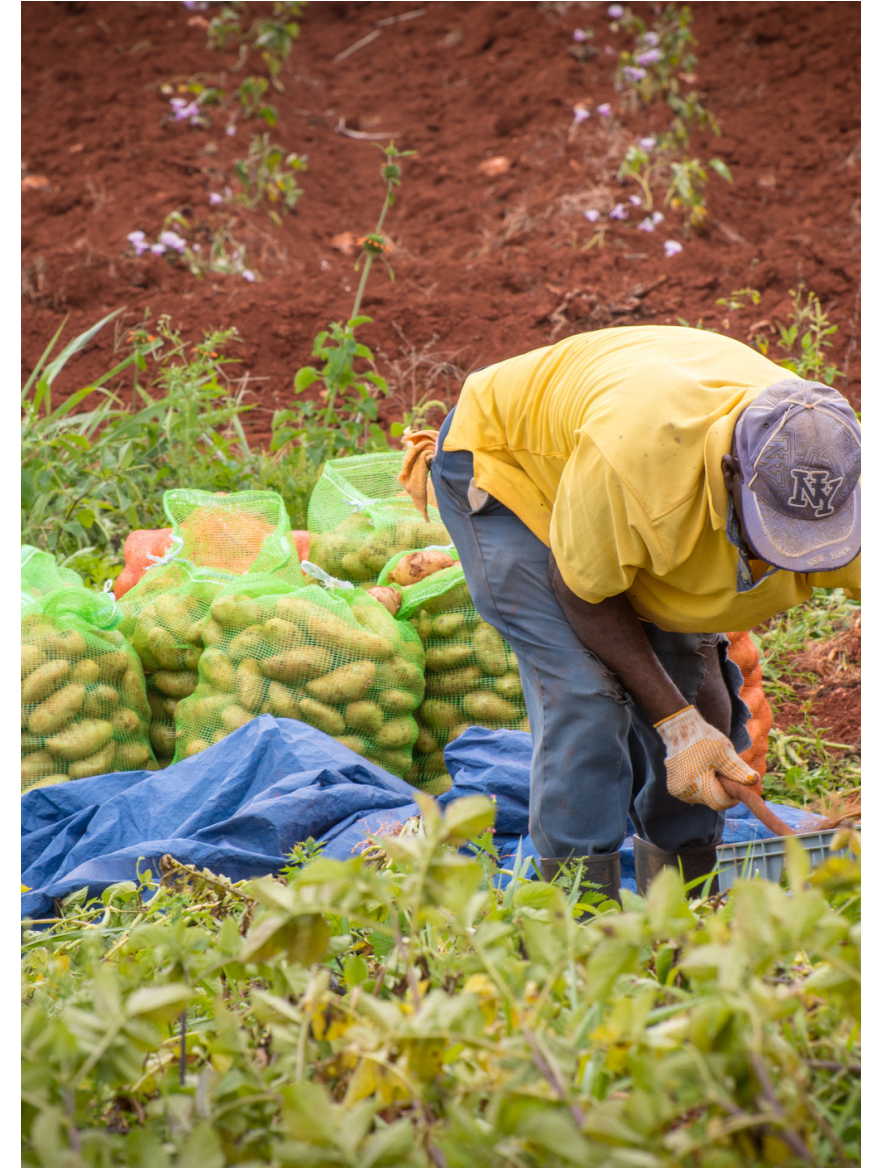


Social Functions – agriculture shapes social and cultural systems, including the maintenance of cultural heritage as societies still identify strongly with their historical origins in agrarian communities and rural lifestyles.



Case Example: Environmental Services Vital to Agriculture

- Soil Forming and Conditioning – Invertebrates develop upper soil layers through decomposition of plant matter, making organic matter more readily available, and creating structural conditions that allow oxygen, food and water to circulate
- Waste Disposal – Ecosystems recycle, detoxify and purify themselves, provided that their carrying capacity is not exceeded by excessive amounts of waste and by the introduction of persistent (synthetic) contaminants. (Nutrient filtering by mangroves can be likened to oxidation ponds of traditional wastewater treatment plants)
- Pest Control – Predator-prey populations create a self-regulating balance, whereby biological (inter-species) competition keeps more pests in check than could ever be accomplished through the use of pesticides.
- Biodiversity – Ecosystem stability depends on the results of competition between different species for food and space. It is this competition that increases species diversity
- Pollination – 220,000 out of 240,000 species of flowering plants are pollinated by insects.
- Carbon Sequestration – Because biomass has the capacity to store carbon, where the soil is not tilled, or where minimum tillage is practised, soil contributes to carbon retention.
- Habitat – The provision of space, shelter and food for many important macro- and microorganisms, such as earthworms.



Agricultural Practices, Population and Food Security... are we food secure?

- Nearly 800 million people out of 8 billion people are undernourished around the world
- Food needs in developing countries are doubling with most growth taking place in urban centres
- Population growth and increased demands of urban and rural populations are influencing agricultural practices.
- Efforts to increase production and improve food security and well-being, through intensification and new technologies have, in some cases resulted in negative environmental and health impacts.
- The present need is, therefore, to obtain the most food from existing land as increasing populations put greater pressure on land use, and decreases the amount of arable land per person.
- There is also the issue of rural to urban migration which leaves fewer farmers to meet the growing urban food demand, placing increased pressure on agricultural production as fewer farmers are required to produce more.
- Most experts agree that agriculture intensification is necessary because the area of highly productive arable land is limited and diminishing, and that only by increasing yields per unit will the demands of a growing world population be met.
- The pressure to produce enough food has had a worldwide impact on agricultural practices.



Environmental Implications of Agriculture

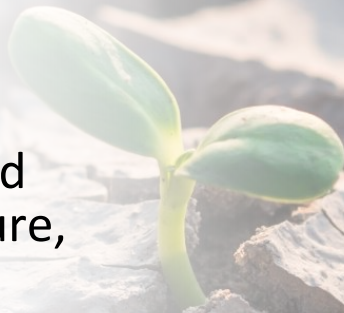
- . Implication on Land Resources
- . Implications on Water Resources
- . Implications on Human Health

How Agriculture Affects Land Resources

- Degradation of agricultural land and decline in soil fertility continue to be major threats to food security, and sustained agricultural productivity, especially in developing countries.
- Soil Degradation can be caused by:
 - Wind and water erosion of exposed topsoil
 - The compaction of soil
 - The loss of soil organic matter
 - The loss of water holding capacity
 - The loss of biological activity
 - Salinisation of soil and irrigation water
 - Overgrazing, which results in desertification
- The degradation of farmland resulting in the loss of soil productivity may occur following a process of agricultural use which is identified by the following three distinct stages:
 - The heavy use of fertilisers and other inputs keeps production at high levels and hides the gradual loss of soil structure and organic matter.
 - The intensive use of tractors and ploughs compacts the soil, accelerates nutrient loss and reduces soil productivity.
 - Severe soil erosion and decreased crop yields forces farmers to finally abandon the land.

Land Degradation

- Land degradation affects approximately:
 - 70% of the world's rangelands
 - 40% of rain fed agricultural lands
 - 30% of irrigated lands.
- Increasing land degradation, desertification and deforestation are caused by poverty, population pressure, unsuitable land use and unsustainable agriculture, grazing and forestry practices, insecure land tenure, and lack or misuse of technology.
- Land degradation has major impacts on biodiversity, as the quality of the land is reduced, and it's capacity to support animal, plant and microbial life declines.



TODAY'S CONSUMPTION PATTERNS – THE CASE OF BEEF AND LAND DEGRADATION

- * Land used up to grow grain to feed cattle
- * Large scale deforestation for ranching
- * Additional land required for pastures and grazing
- * Overgrazing leads to land degradation, topsoil loss, water wastage & depletion
- * With industrial agriculture more chemicals used
- * More energy used to create fertilizers, pesticides, herbicides, to grow grain to feed cattle



Combating Land Degradation



INTEGRATED LAND USE
PLANNING AND MANAGEMENT
OPERATIONS



LAND CONSERVATION



SUSTAINABLE AGRICULTURE
PRACTICES

How Agriculture affects Water Resources

Agriculture is the single largest user of freshwater resources in the world, using on average, approximately 70% of all surface water supplies, most of which is recycled back into surface and/or groundwater sources.



Agriculture is also the largest non-point source of water pollutants contributing to water pollution through a variety of mediums, including:

The discharge of pollutants (fertilizers - nitrates and phosphorous - and pesticides) and sediment to surface and /or groundwater

Net loss of soil by poor agricultural practices

Salinization and water logging of irrigated land

Ways in which we can reduce the effects of agriculture on water resources



The establishment and operation of cost-effective water quality monitoring systems for agricultural water uses.



The optimal use of on-farm inputs and the minimisation of the use of external inputs in agricultural activities.



The prevention of soil runoff and sedimentation.



The proper disposal of sewage from human settlements and of manure produced by intensive livestock breeding.



The minimisation of adverse effects from agricultural chemicals by the use of integrated pest management



The education of communities about the pollution impacts of the use of fertilisers and chemicals on water quality and food safety.



Pesticide Use and Human Health

- Pesticides are an integral component of agricultural systems throughout the world and contribute significantly to improved crop yields and enhanced food production.
- It is generally accepted that this will continue for the foreseeable future if production of food of acceptable quality is to increase.
- Pesticide use has negatives as well as positives.
- In the environment pesticides change into other chemicals and the excessive residues of pesticides and their transformation products have the potential to harm human health and the environment and pose ecological risk to ecosystems.
- The use of pesticides has caused chemical resistance in over 400 insects and mite pests, and more than 70 fungal pathogens as well as placed stresses on pollinators and other beneficial species.
- Negative impacts on human health
- Maximum residue levels (MRLs)
- Persistent Organic Pollutants

CHARACTERISTICS OF POPs

- ◆ Persistent Organic Pollutants are those chemicals which:
 - Persist- that is remain in the environment for long periods
 - Spread thousands of kilometers from point of emission
 - Magnify as they bio-accumulate up the food chain
 - Untraceable

EFFECTS OF POPs


- ◆ Because of their specific characteristics, the chemicals referred to as POPs have the ability to impact on both health of human beings and on the wider environment.

EFFECTS OF POPs ON HUMAN HEALTH

- ◆ Once a POP enters the body it is stored in the fatty tissues and never leaves.
- ◆ Over exposure to certain POPs can cause serious negative health effects in humans including:
 - Serious immune metabolic effect
 - Disrupted endocrine effects
 - Learning disabilities and neurological defects
 - Reproductive anomalies
 - Cancer
 - Developmental effects
 - Menstrual disorders, such as endometriosis

EFFECTS OF POPS ON THE WIDER ENVIRONMENT

- ◆ POPs are the main cause of damage to several types of animals and birds.
- ◆ Reproductive problems, deformities and behavioural abnormalities have been found in several species of mammals, birds, fishes and reptiles



Understanding the True Nature of Climate Change

- Climate is one of the most pressing challenges of our time, affecting every aspect of our lives and the planet.
- It poses significant risks and threats to human health, food security, water availability, biodiversity, and economic development. To cope with the impacts and uncertainties of climate change, we need to adapt to the changing conditions and reduce our vulnerability. This is the essence of climate adaptation.
- Climate Adaptation is the process of adjusting to the actual or expected effects of climate change, to moderate harm or exploit beneficial opportunities.
- Climate Adaptation can involve actions at different levels, from individuals and communities to governments and organizations, and across different sectors, such as agriculture, water, health, and energy. It can also take various forms, such as building resilience, enhancing adaptive capacity, managing risks, and transforming systems.
- Climate change changes the magnitude and frequency of extreme weather events
- Climate change changes average climatic conditions and climate variability, affecting underlying risk factors
- Climate change generates new threats

Agriculture and Climate Change



- Agriculture is responsible for an estimated 1/3rd of global warming and climate change. Approximately 25% of, carbon dioxide, is produced by agricultural sources, mainly deforestation and the burning of biomass.
- Most of the methane in the atmosphere comes from cattle rearing, forest fires, wetland rice cultivation and waste products, while conventional tillage and fertiliser use account for 70% of the nitrous oxides.
- As well as being a contributor to climate change, agriculture is also threatened by the potential consequences of global warming. The following are among some of the impacts of climate change



Impacts of Climate Change on Agriculture

- Amplifying extreme weather events- extreme weather events such as droughts
- Disease infestation and crop failure due to extreme weather events such as hurricanes and droughts
- Shifting climate zones towards the poles- average temperature are expected to increase more near the poles
- Reduced soil moisture- higher air temperature will cause higher soil temperature which will accelerate the decay of soil organic matter
- Drying of soil due to higher air temperatures.
- Flooding of farmland and increase sodium levels of coastal soil due to sea-level rise

Reducing the impacts of agriculture on the environment

- Sustainable Agriculture
- Conservation Agriculture
- Organic Agriculture



Sustainable Agriculture



Sustainable agriculture does not mean a return to low yields or poverty among the farming class, but rather building on agricultural achievements, adopting a more sophisticated approach that can maintain high yields and farm profits without undermining the resources on which agriculture depends.



Sustainable agricultural practices help to minimise the adverse effects of agriculture on the environment, while still providing a sustained level of production and profit, by focussing on:

The optimisation of skills and technology

The application of management strategies for the selection of hybrids and varieties, soil conservation, soil fertility and pest management programmes.

Conservation Agriculture

- Conservation agriculture also referred to as resource efficient or resource effective agriculture, aims at conserving, improving and making more efficient use of natural resources through the integrated management of available soil, water and biological resources in combination with external inputs. This method of agriculture contributes to environmental conservation as well as to enhanced and sustained agricultural production.
- Key elements of conservation agriculture include:
 - Zero or minimum tillage
 - Varied crop rotation
 - Direct seeding

Sustainable Farming Practices

- Crop Rotation
- Integrated Pest Management
- Increased use of Biological Weed Control
- Use of natural or synthetic inputs in a way that poses no significant threats to humans, animals or the environment

