Biodiversity Protection, Farmers and Breeders Right

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Lecture 37 : Biodiversity and Interrelationship with Life

" Welcome to the course on Biodiversity Protection, Farmers and Breeders Right. This lecture will be about biodiversity and its interrelationship with life. The concepts covered in this lecture are life on earth, threats to biodiversity and health, nutritional impact of biodiversity, importance of biodiversity for health research and traditional medicine, climate change, biodiversity and health. The keywords of this lecture can be seen here. Biodiversity underpins all life on earth and refers to biological variety in all its forms from genetic makeup of plants and animals to cultural diversity. Biodiversity provides many goods and services which are essential to the existence of life on earth.

The management of natural resources can determine the baseline health status of a community. Environmental stewardship can contribute to secure livelihoods and improve resilience of communities. The loss of these resources can create the conditions responsible for morbidity and mortality. Healthy communities rely on well functioning ecosystems.

They provide clean air, fresh water, medicines and food security. They also limit diseases and stabilize the climate. But unfortunately, biodiversity loss is happening at unprecedented rates and it is determinedly impacting human health worldwide. So, sustenance of mankind is directly dependent on biodiversity conservation. Mankind is dependent on the nature for many of the things which are essential for its existence.

The impact of pollution and other issues related to biodiversity is detrimentally affecting the survival of mankind and other species which are living along with us in the nature. Biodiversity supports human and societal needs including food and nutrition security, energy, development of medicines and pharmaceuticals and fresh water which together required for a good health. It also supports economic opportunities and leisure activities that contributes to overall well being of the mankind. Land use change, pollution, poor water quality, chemical and waste contamination, climate change and other causes of ecosystem degradation all contribute to biodiversity loss. This can pose considerable threats to human health and survival as well.

Human health and well being are influenced by health of local plant and animal

communities and the integrity of local ecosystems that they form. Infectious diseases cause over 1 billion human infections per year with millions of death each year globally. Approximately two-thirds of the non-human infectious diseases are shared with animals and majority of recently emerging diseases are associated with wildlife. Our recent experiences from the COVID-19 pandemic also stresses the importance of living with nature and taking care of biodiversity. The understanding that conservation of biodiversity is extremely important for the survival of mankind has to be there at governmental level and at the level of general public.

Then only it can facilitate adoption of policies and programs that go well with the requirements of biodiversity conservation. What does biodiversity mean for human health? People depend on biodiversity in their daily lives in ways that are not always apparent or appreciated. Human health ultimately depend upon ecosystem products and services such as availability of fresh water, food and even fuel. These are all required for good human health and productive livelihoods. Biosciency laws can have significant direct human health impact and if ecosystem services are no longer available to meet the social needs of mankind, then it is going to have very serious impact on our survival.

Indirectly changes in ecosystem services can affect livelihood, income and local migration. The survival of rural population is also directly connected with the good health of environment. They depend upon the environment around them for their livelihood, income and survival. So, detrimental impacts on the biodiversity can directly affect their livelihood, their income and their survival. Additionally, biological diversity of microorganisms, flora and fauna provides extensive benefits for biological health and pharmaceutical sciences.

Significant medical and pharmacological discoveries are made through greater understanding of the earth's biodiversity. Laws in biodiversity may limit the discovery of potential treatments for many diseases and health problems. Now, for many of the problems that the mankind is facing, we are looking for solutions in the nature. So, nature become the solution of many of the problems that we are facing today. For the modern day diseases, we are looking for the cure in the nature.

So, the plants and other living organisms like animals and microorganisms can provide the cure for many of the diseases that mankind is facing. But adverse effects on the biodiversity will lead to the extinction of these species or varieties and finally, can affect the survival of mankind. The threats to biodiversity and health, there is growing concern about the health consequences of biodiversity laws. Biodiversity changes affect ecosystem functioning and significant disruptions of ecosystems can affect the availability of life sustaining ecosystem goods and services. So, it is not only the general environment around

us, it is also the ecosystem goods and services on which we are dependent on.

So, we depend on the nature for these various ecosystems good and services. Biodiversity laws also means that we are losing before the discovery many of the natures chemicals and genes of the kind that have already provided mankind with enormous health benefits. So, the loss of biodiversity is ultimately leading to the complete extinction of those varieties which may have contributed towards the well being and survival of mankind. The nutritional impact of biodiversity, biodiversity plays a crucial role in human nutrition through its influence on world food production as it ensures the sustainable productivity of soils and provide the genetic resources for all crops livestock and marine species harvested for food. Access to biodiversity resources is a fundamental determinant of health.

We are dependent on the nature around us for our food. The variety of plants and animals around us provides the food which are required for the survival of mankind. So, if the genetic diversity of the crops and livestock is lost, it will have detrimental impact on the food security of mankind. The nutrition and biodiversity are linked at many levels the ecosystem with the food production as an ecosystem service, the species in the ecosystem and the genetic diversity within the species. The nutritional composition between foods and among varieties, cultivars, breeds of the same food can differ dramatically affecting micronutrient availability in the diet.

That is why genetic diversity in the crops and the livestock is extremely important for providing nutritious food. Healthy local diets with adequate average levels of nutrient intake necessitate maintenance of high biodiversity levels. That is how the genetic diversity existing in the nature is becoming extremely important for the survival of mankind. The intensified and enhanced food production through irrigation, use of fertilizers, plant protection or the introduction of crop varieties and cropping patterns affect the biodiversity. So, organized farming or monoculture can have detrimental impact on biodiversity, if we are not taking adequate measures to ensure protection of genetic diversity.

So, protection of genetic diversity is extremely important for the survival of modern agricultural practices. Otherwise, this can have direct impact on the global nutritional status and the human health. This makes the communities more vulnerable and can have detrimental impacts on their survival. The importance of biodiversity for health research and traditional medicine. The traditional medicine continues to play an essential role in the health care especially the primary health care.

The traditional medicines are estimated to be used by 60 percentage of the world's

population and in some countries are extensively incorporated into the public health system. So, apart from the modern medicine, the traditional medicinal systems like Ayurveda or Unani also contributes to the well-being of mankind. Many times they are also integrated into the public health system playing a very important role in the protection of public health. Medicinal plants use is most common medication tool in the traditional medicine and complementary medicine worldwide. Medicinal plants are supplied through collection from wide populations and cultivation.

Many communities rely on natural products collected from ecosystems for medicinal and cultural purposes in addition to food. So, apart from food for our medicinal requirements also, we are dependent on the biodiversity around us. The traditional medicinal practices are completely dependent on the genetic diversity which is existing in the nature. Many of the plants which are used in Ayurveda is also facing extinction or other levels of threat due to biodiversity loss. Although synthetic medicines are available for many purposes, the global need and demand for natural products persist for use as medicinal products and for biomedical research.

Infectious diseases, human activities are disturbing both the structure and functions of ecosystems and altering native biodiversity. Such disturbances reduce the abundance of some organisms and cause population growth in some others. This modifies the interaction among organisms and alter the interaction between organisms and their physical and chemical environments. So, the genetic diversity within the nature provides for the stability in environment, but the disturbances like reduction in abundance of some organism or the population growth in some other organism can affect this stability and detrimentally impact the conservation of environment. Patterns of infectious diseases are sensitive to these disturbances.

Many processes affecting infectious disease, reservoirs and transmission include deforestation, land use change, water management for example, through dam construction, irrigation, uncontrolled urbanisation or urban sprawl, resistance to pesticide chemical used to control certain disease vectors, climate variability and change, migration and international travel and trade and the accidental or intentional human introduction of pathogens. So, this means that the adverse effects on environment can have disastrous consequences at an unimaginable level. So, many of the drastic effects that the loss of biodiversity can cause cannot be imagined at this stage. Climate change, biodiversity and health. Biodiversity provides numerous ecosystem services that are crucial to human well-being at present and in the future.

Climate is an integral part of the ecosystem functioning and human health is impacted directly and indirectly by the results of climatic conditions on terrestrial and marine

ecosystems. Climate change can directly impact human well-being and survival. Marine biodiversity is affected by ocean acidification related to levels of carbon in the atmosphere. Terrestrial biodiversity is influenced by climate variability such as extreme weather events like drought or flooding that are directly influencing ecosystem health and productivity and availability of ecosystem goods and services for human use. Now, we know that drought and flooding has become so common in our weather pattern.

So, this means that the impact on biodiversity is already drastic and it is having serious consequences in our weather pattern. So, the weather events like drought and flooding have serious consequences on the well-being and survival of mankind. It can affect many things like the travels, the trade and commerce, production of agricultural resources and even the survival of mankind. Longer term changes in climate affect the viability and health of ecosystems influencing shifts in the distribution of plants, pathogens, animals and human settlements. The WHO IUCN working group on biodiversity climate one health and natural based solutions.

The World Health Organization through its Department of Environment climate change and health, the International Union for Conservation of Nature and Friends of ecosystem based adaptation network are establishing a working group on biodiversity climate one health and nature based solutions. This initiative builds upon and expands the scope of work carried out by Interagency Leysian group on biodiversity and health co-chaired by WHO and the CBD between 2015 and 2020. The working group will develop guidance and tools to support the operationalization of one health approaches and nature based solutions by identifying co-benefits and trade-off for human and ecosystem health, strengthening social and ecological resilience and supporting a healthy green and just recovery from COVID-19. The work of the working group includes examining the relationship between biodiversity, ecosystem, degradation, climate and disease emergence with a view of maximizing health co-benefits of sustainable ecosystem management and restoration. It also includes assessing the role of environmental, social and economic determinants of health and develop tools to strengthen cross sectorial collaboration, policy coherence and operationalization of one health approach.

Another area of activity is mainstream health and biodiversity to support a transition towards sustainable and healthy food systems in a way that also support dietary diversity, the sustainable management and use of biodiversity in agriculture, fisheries and forestry ecosystems, regenerative agriculture practices, crop diversity and sustainable harvesting practices, sustainable fisheries, sustainable management of livestock, wildlife, terrestrial, coastal and marine ecosystems, climate change, adaptation and mitigation and the interaction between these drivers responses and outcomes. Another activity is examining the contribution of biodiversity and green and blue infrastructure to support the creation

of health promoting environments and improve mental and physical health outcomes in both rural and urban areas including the development and implementation of nature based solutions focused on health co-benefits. Another area of activity is evaluating climate change as a cross cutting driver and amplifier of ecosystem degradation, biodiversity loss and ill health and developing policy guidance to maximize the health co-benefits of ecosystem based adaptation and mitigation efforts. There have been several major global scientific assessments with regard to biodiversity. Some of the assessments are detailed in this lecture.

The 2020 global biodiversity outlook 5, the flagship publication of the CBD shows that pathways to sustainable future require setting up efforts to conserve and restore biodiversity addressing climate change and transforming the way we produce, consume and trade goods and services particularly the food. The 2019 global assessment on biodiversity and ecosystem services of the intergovernmental science policy platform on biodiversity and ecosystem services which is known as IPBS provides overwhelming evidence that nature is declining globally at unprecedented rates with grave impact for the people. The 2019 state of world's biodiversity for food and agriculture of the commission of genetic resources for food and agriculture of the FAO which is the food and agriculture organization concludes that the biodiversity that is the basis of agriculture and food production is declining rapidly with only nine plant species accounting for 66% of the total crop production and nearly a third of the fish stocks being over-fished. The 2018 special report on global warming of the intergovernmental panel on climate change finds that limiting global warming to 1.5 degree Celsius compared to 2 degree Celsius is projected to lower the impacts on terrestrial, freshwater and coastal ecosystems and to retain more of their services to humankind.

The 2016 world ocean assessment concluded under the UN regular process for global reporting and assessment of state of marine environment including socioeconomic aspect notes that main drivers of increased pressures on marine biodiversity come from activities on land including agricultural production and trade industries and coastal degradation. To conclude biodiversity is directly connected to the human well-being and livelihood, we are all part of the same ecosystem. The Convention on Biological Diversity and its protocols provide the mandate for international community to conserve biodiversity, use its components sustainably and share fairly and equitably the benefits arising from the use of genetic resources. The post 2020 global biodiversity framework offers an opportunity to identify the transition pathways towards a sustainable future. The references of this lecture can be seen here.

Thank you very much for listening to the lecture. I hope you are all enjoying the course.