UNIT IV

ECOLOGICAL DIVERSITY AND AGRICULTURE

Ecological diversity, wild life and agriculture – GM crops and their impacts on the environment – Insets and agriculture – Pollination crisis – Ecological farming principles – Forest fragmentation and agriculture – Agricultural biotechnology concerns.

ECOLOGICAL DIVERSITY, WILD LIFE AND AGRICULTURE

ECOLOGICAL DIVERSITY

Ecosystem diversity is a type of biodiversity. Ecosystem diversity refers to the diversity of a place at the level of ecosystems. The term differs from biodiversity, which refers to variation in species rather than ecosystems. Ecosystem diversity can also refer to the variety of ecosystems present in a biosphere, the variety of species and ecological processes that occur in different physical settings.

An example of ecological diversity on a global scale would be the variation in ecosystems, such as deserts, forests, grasslands, wetlands and oceans.

Ecological diversity is the largest scale of biodiversity, and within each ecosystem, there is a great deal of both species and genetic diversity.

Ecosystem diversity deals with the variations in ecosystems within a geographical location and its overall impact on human existence and the environment.

Diversity in the ecosystem is significant to human existence for a variety of reasons.

Ecosystem diversity boosts the availability of oxygen via the process of photosynthesis amongst plant organisms domiciled in the habitat.

Diversity In an aquatic environment helps in the purification of water by plant varieties for use by humans.

Diversity increases plant varieties which serve as a good source for medicines and herbs for human use.

A lack of diversity in the ecosystem produces an opposite result.

Some examples of ecosystems that are rich in diversity are:

Deserts

Forests

Large marine ecosystems

Marine ecosystems

Old growth forests

Rainforests

Tundra

Coral Reefs

Marine

Threat to ecosystem diversity

Pollution is a serious threat to ecosystem diversity.

Toxic pesticides and fertilizers are spread on agricultural crops and their impact is rarely confined to agricultural pests.

Climate change threatens the biodiversity of many ecosystems. Currently, corals are dying at a rapid rate throughout the world.

One probable reason for this is the warming of ocean temperatures as a result of global climate change. Coral reefs are one of the most diverse ecosystems on the planet, not only home to countless species, but a place of enormous forms of interactions among species. When the corals die, the many ecosystems that occur in the reefs diminish in biodiversity.

WILD LIFE AND AGRICULTURE

Agricultural land provides important habitat to a variety of wildlife species, with natural land for pasture, woodlands and wetlands having the highest habitat value. Wildlife supplies many ecosystem services to the agricultural industry, and farmers can adopt several agricultural practices that enhance wildlife habitat.

In 2011, nearly one-third (30.2%) of agricultural land was wildlife habitat,

Three-quarters of wildlife habitat reported by farmers was natural land for pasture (75.0%), and the remainder was woodlands and wetlands (25.0%).

Two in five farms (40.3%) reported natural land for pasture while one in two farms (49.9%) reported woodlands and wetlands in 2011.

The relationship between agriculture and wildlife is a complex blend of co-operation and challenges. As agricultural land and wildlife habitat are converted for other uses, the co-existence of agriculture and wildlife could become increasingly important.

Agricultural land represents the total farm area reported in the 2011 Census of Agriculture and includes the following land use categories: cropland, summer fallow, tame or seeded pasture, natural land for pasture, woodlands and wetlands, and all other land.

Cropland represents the areas reported for field crops, hay, vegetables, sod, nursery products, fruits, berries and nuts.

Wildlife habitat refers to two agricultural land use categories:

Woodlands and wetlands

Natural land for pasture.

The category woodlands and wetlands is a combined variable and it is not possible to determine the relative contributions of the two components.

Wildlife habitat is any land that can be used as a shelter, breeding ground or a food source for wildlife. While most agricultural land provides at least one of these requirements, woodlands and wetlands, and natural land for pasture support more species and rank higher in terms of habitat value

The woodlands and wetlands category includes forests, woodlots, tree windbreaks, hedgerows, ponds, rivers, marshes, bogs, riparian areas and other wetlands. These habitats are used by a variety of wildlife including birds, small and large mammals, fish, amphibians, reptiles and insects. Wetlands remain one of the most important habitat types in the category. They support a large and diverse number of animals, and many species depend on wetlands for all of their shelter, breeding and feeding needs

The natural land for pasture category represents pasture land that has not been cultivated, drained, irrigated or fertilized. It includes grasslands and woodlands used for pasture. Grasslands provide habitat to a diversity of wildlife such as small and large mammals, grassland raptors, nesting birds, songbirds and pollinating insects.

How do farmers benefit from wildlife?

Wildlife provides many benefits to farmers that are not always obvious. These “ecosystem services” include crop pollination, breakdown of organic matter to provide nutrients for crops, contaminant degradation and agricultural pest control.

Agricultural dependence on pollinators

One of the valuable ecosystem services that wildlife provides to agriculture is pollination. While some food crops grown require insect pollinators to produce a crop or to achieve maximum yields, for other crops, pollinators have little effect on crop production.

The majority of the fruits, and certain vegetables and field crops reported in the Census of Agriculture, depend on pollinators for pollination. For fruits and vegetables alone, pollinators are required for maximum production of 14 food crops,

Pollinators are also required for successful crops of buckwheat, sunflowers, mustard seed and caraway seed, and can increase the yields for some canola crops, as well as certain varieties of soybeans and dry beans.

The presence of wild pollinators and wildlife habitat has economic advantages for farmers. Some farms rely fully on wild pollinators, such as solitary bees, bumble bees, other wild bees, wasps and flies for pollination, while other farms bring in additional pollinators to achieve adequate pollination.

For many crops that benefit from pollinators, production is positively related to the availability of wild pollinator habitat. Wildlife habitat in the surrounding area can enhance pollination by wild pollinators and thereby increase yields.

Farm practices benefit wildlife

There are several agricultural practices that enhance wildlife habitat. Examples include rotational grazing, windbreaks, winter cover crops, and buffer zones around water bodies, and tillage practices that retain most of the crop residue on the surface. These practices are mutually beneficial to both the farm and wildlife.

Hedgerows and tree windbreaks:

Hedgerows, fencerows and windbreaks can provide shelter, food and breeding sites to many wildlife species. They can also serve as valuable travel corridors that allow animals to move between habitats. For farmers, the advantages of these agricultural features and the wildlife they support include pollination, reduced soil erosion and natural agricultural pest control. In 2011, windbreaks or shelterbelts were reported on 29.7% of all farms, down from 36.9% in 2006.

Tillage:

Crop residues are materials, such as straw, stalks and stubble, that are left on a field or orchard after a crop has been harvested. The amount of crop residue that remains on the surface after harvesting depends on the type of tillage used to prepare the soil for the next crop.

Conventional tillage incorporates most of the crop residue into the soil, whereas conservation tillage and no-till retain most of the crop residue on the surface. Several wildlife species find refuge, feed and nest in crop residue, therefore these species benefit from no-till and properly timed conservation tillage. From the perspective of the farmer, no-till and conservation tillage can reduce soil erosion, increase soil organic matter and help retain soil moisture. One of the

negative aspects of no-till seeding is that farmers will typically rely more heavily on pesticides to control weeds and insects.

Grazing:

Farms use both natural and tame pasture land for livestock grazing. Both types of pasture are also used by wildlife, although natural pasture is considered more valuable as both feeding and breeding habitat. Grasslands, in particular, provide habitat for a large diversity of wildlife, including many grassland birds that benefit from well-managed livestock grazing.

For pasture land in general, wildlife habitat and the quality of livestock forage can be improved by implementing rotational grazing. Rotational grazing involves alternating use of two or more pastures at regular intervals, or temporary fences within pastures to prevent overgrazing.

Buffer zones:

Buffer zones are strips of land around water bodies including streams, rivers and wetlands. They prevent sediments and contaminants from entering water bodies, provide wildlife habitat, and act as travel corridors between habitats. This, in turn, improves water quality for livestock use and protects fish stocks for recreational use.

Conserving natural pasture, woodlands and wetlands:

Conserving natural pasture, woodlands and wetlands in the agricultural landscape is an important step to maintaining these valuable habitats.

With important wildlife habitat representing 30% of all agricultural land reported in the Census of Agriculture, and wildlife providing invaluable ecosystem services, the relationship between agriculture and wildlife might be described as co-dependent.