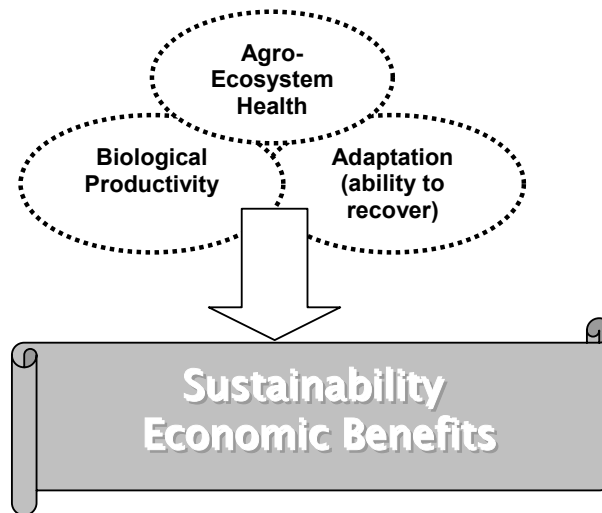


## What are the Benefits of Agricultural Biodiversity?

*"A healthy environment is the basis for a healthy economy. Without the products and services that diverse, natural systems provide, we would not be able to survive, let alone prosper." Biodiversity Project...[1]*



According to FAO biodiversity provides three broad benefits for agriculture [2]. These broad benefits translate into real economic benefits.

**(1) Biological Productivity.** Biodiversity within agro-ecosystems provides more opportunity for crops and livestock to efficiently use available resources through biological interactions and synergy. Also, the diversity of the crop gene pool has allowed development of crop varieties with very high production rates.

**(2) Adaptation.** Biologically diverse agro-ecosystems are more resilient to natural and human-induced disturbances. When many different species perform

similar functions in the ecosystem there is less chance that the functions will be lost. Thus, agricultural biodiversity can act as insurance for farmers in the face of uncertainty.

**(3) Agro-ecosystem Health.** Biological components of agro-ecosystems provide services that are essential to human existence. Food and fiber production, nutrient cycling, and clean air and water are just a few of the services provided by biological components of the ecosystem. Reduced biological diversity could reduce the effectiveness of these services or even the services themselves. Research implies that greater biodiversity provides more resilient and efficient ecosystems. Removing one species from the

ecosystem may appear to have no effect, but the complex interactions among different species may cause the ecosystem to change in ways we cannot imagine.

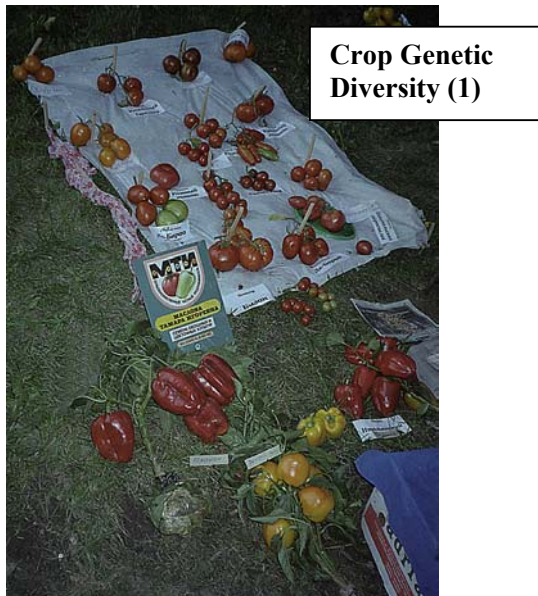
**(4) Economic Benefits** USAID [3] estimates that biodiversity provides at least 16 trillion *UAH*, or nearly 11% of the world Gross Domestic Product. Loss of biodiversity and related ecosystem functions can generate huge economic costs. For example, polluted air and water increase illness and reduce productivity. Lost pollinators may be

irreplaceable or replaceable at a prohibitive cost. Degraded ecosystems lose their capacity to filter and store water, and cycle nutrients. This can force cities to build expensive water treatment plants and farmers to import expensive fertilizers or reduce crop yields.

A very important benefit of biodiversity is “*potential future value*”. Some species have the potential to provide tremendous future benefits. We don’t know which species will provide these benefits, so it is important to preserve as many of them as possible.



## Some specific benefits of agricultural biodiversity



Genetic diversity (variation within crop species) is essential for adaptation to particular environments. Natural and human selection has led to development of many thousands of varieties.



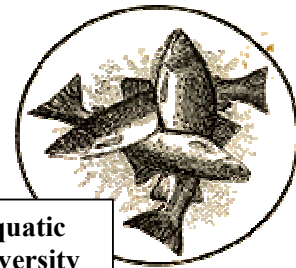
Wild species of higher plants provide important nutritional supplements for many poor rural households [6]. Wild relatives of crop plants supply genetic material for developing new varieties of crops adapted to specific environments. Wild plants near fields may harbor insects or other predators of crop pests. They may also provide alternate food sources for pollinators [7]. Some weeds may also supply food or forage after crop harvest. Because some cultures carefully nurture wild plant populations, there is no strict division between domesticated and wild species.



**Livestock  
Diversity (3)**

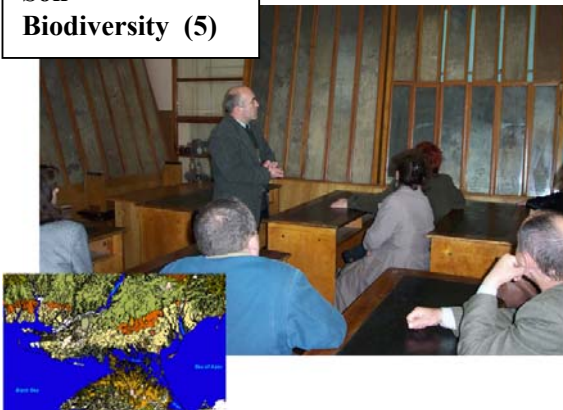
Only about 30 different species of livestock provide food, clothing, fertilizer, fuel, draught power, and tools for different cultures around the world. From these 30 species about 6000 breeds have been developed to fit local environmental conditions and meet local needs. This diversity has allowed livestock to thrive in a variety of climates and to adapt to diseases, parasites, and variations in food and water supply. It is estimated that more than 1/3 of these breeds are at risk of extinction [4].

Aquaculture is a growing agricultural enterprise in many parts of the world. Fish and other aquatic species provide a large portion of dietary protein for many cultures. The variety of aquatic organisms being cultivated is increasing. Varieties are also adapted to local conditions. Some aquatic organisms are predators of insect pests. Many are also good indicators of water quality [5].



**Aquatic  
Diversity  
(4)**

**Soil  
Biodiversity (5)**



The soils in Ukraine harbor a wide variety of organisms that benefit agriculture. Crop roots vary between and among plant species. Roots absorb crop nutrients, anchor crops, stabilize the soil against erosion, and contribute to soil organic matter. Microorganisms and

other soil organisms play a major role in decomposition of crop residues, releasing nutrients for the next crop. Some microbes are crop pathogens, while others, such as *mycorrhizae* and *rhizobia*, are involved in symbiotic (mutually beneficial) relationships with crops. Soil microorganisms provide food for other soil organisms, some of which act as natural enemies of plant pests. Other microorganisms directly antagonize plant pests. Earthworms help mix and loosen the soil allowing plant roots easier access to nutrients and water.



**Arthropod  
Diversity (6)**



Many insects, spiders and other arthropods serve as natural enemies of crop pests or as alternative food sources for enemies of pests. Arthropod communities can be highly effective in controlling pest outbreaks in agricultural systems. Arthropods also function as important crop pollinators.



**Associated  
Biodiversity (7)**

Birds, mammals, reptiles and amphibians are also important components of the agricultural ecosystem. These “associated organisms” may disperse seeds, consume insect pests and serve as pollinators. Equally important they serve as a bridge between the agricultural ecosystem and the broader ecosystem. Thus they are excellent indicators of sustainability in the agro-ecosystem.

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4. UNEP/CBD/SBSTTA/7/INF/13 5 November 2001. Agricultural Biological Diversity, the First Report on the State of the World's Animal Genetic Resources for Food.
5. Terrell, C.R. and P.B. Perfetti. 1989. Water Quality Indicators Guide. USDA-SCS, SCS-TP-161 128 pp.
6. FAO. 1999. Use and Potential of Wild Plants in Farm Households. <http://www.fao.org/DOCREP/003/W8801E/w8801e00.HTM>
7. Sammataro, D. and A. Avitabile. 1986. The Beekeeper's Handbook, 2<sup>nd</sup> edition. Collier Books, Macmillan Publishing Company, New York.

#### Photo Acknowledgements:

- Photo (1) Vasyl Prydatko, ULRMC BINU Project  
Photo (2) Microsoft photo clip art  
Photo (3) Eaap animal genetic database, <http://www.tiho-hannover.de/eiricht/zucht/eaap/descript/231.htm>  
Photo (4) Ukrainian fishing, <http://www.fishing.kiev.ua/>  
Photo (5) Vasyl Prydatko, ULRMC BINU Project  
Photo (6) IronOrchard, <http://www.ironorchard.com>  
Photo (7) Microsoft clip art

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<http://www.ulrmc.org.ua/services/binu/index.html>.

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